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# A GUIDE AND KEY TO THE AQUATIC PLANTS OF THE SOUTHEASTERN UNITED STATES

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## FEDERAL SECURITY AGENCY U. S. PUBLIC HEALTH SERVICE

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### A GUIDE AND KEY TO THE AQUATIC PLANTS OF THE SOUTHEASTERN UNITED STATES

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#### **ACKNOWLEDGMENTS**

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Fifteen figures in the key (No. 8, 11, 12, 15–19, 23, 25–28, 30, and 32 of Group A) have been borrowed from Coker and Totten, Trees of the Southeastern States. Sixty drawings (No. 2, 4, 10, 13, 14, 20–22, 24, and 34–36 of Group A; No. 4 and 6 of Group B; No. 18, 21, 23, 28, 32, 33, 35, and 36 of Group D; No. 11, 12, 14, 17, and 25–28 of Group E; No. 1, 2, 10, 21, 22, 27, 28, 33, 38, 39, 45, 46, 49, 54, 55, 57, 63, 64, 66, 68, 70, and 71 of Group F; No. 1–4 of the Alismaceae; No. 8 of the Gramineae; and No. 4, 6, 9, and 13 of the Cyperaceae) were borrowed from Britton and Brown, Illustrated Flora of the Northern United States and Canada, through the kindness of the trustees of the estate of Addison Brown. One figure (No. 1 of Group A) was borrowed from a Brooklyn Botanic Garden contribution of H. K. Svenson.

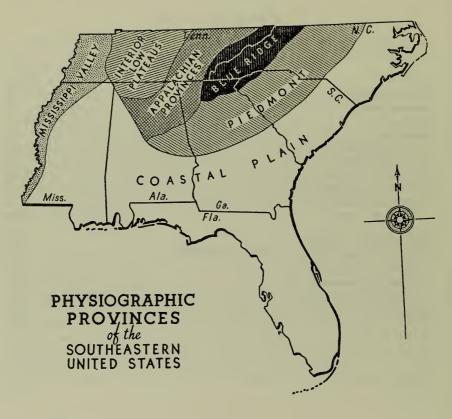
#### REPRINT NOTICE

The Bureau of Sport Fisheries and Wildlife is grateful to the U.S. Public Health Service for permission to reprint its Bulletin No. 286, "A Guide and Key to the Aquatic Plants of the Southeastern United States." When issued in 1944, this publication was very well received and the supply is now exhausted. It has been available only in libraries of some State and Federal agencies, universities, and from private workers fortunate in having a copy in their possession. Because of its continued usefulness, reprinting was arranged without change or alteration to the original. The Bulletin will no doubt continue to serve biologists of the Southeastern States concerned with aquatic habitats for many years to come.

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## A GUIDE AND KEY TO THE AQUATIC PLANTS OF THE SOUTHEASTERN UNITED STATES

#### INTRODUCTION

The purpose of this compilation is to enable workers in the field, with little knowledge of botany, to identify at least generically those fresh water plants with which mosquito breeding is associated. It is hoped that the keys and short notes with their accompanying illustrations will obviate the use of the difficult and cumbersome manuals which are at present the principal source of knowledge concerning the Southeastern aquatic plants, and will enable the worker to make more accurate and adequate evaluations of the area in which he is working.

The area considered in this guide, which in the text is often referred to as "our territory" or "our range," includes the States of Tennessee, North and South Carolina, Mississippi, Alabama, Georgia, and Florida. States adjacent to these may be assumed to have similar aquatic floras, but the range was thus limited because the above States are those with which the authors are best acquainted. On the frontispiece map the primary physiographic regions of these States are shown in outline.

A difficulty in preparing a list of the kind presented here is determining which plants to include. The principal criterion used has been the possibility or likelihood of the plant's being associated with mosquito breeding. Even this breaks down, for in times of very high waters dry land plants like the common cocklebur may shelter larvae. Possibly some of these plants, purposely omitted from the list, should have been included, and undoubtedly there are unintentional omissions of plants that can be found associated with mosquito production; but it is believed that on the whole the situations met within the Southeastern States are covered.

#### GLOSSARY

In as large measure as possible the authors have utilized in the keys parts of the aquatic plant most familiar to the general worker and have used terminology not requiring a great knowledge of plant morphology. But for the sake of exactness it was found necessary to use some of the precise botanical terms. All of these, and some of the better known designations, are included in the illustrated glossary below.

Note.-Work was done at the Office of Malaria Investigations, Memphis, Tenn.

The higher plants ordinarily are made up of roots, stems, leaves, and in proper season flowers or fruits. Each of these presents itself in the widest diversity of form and habit, and each is on occasion lacking in some species. In most cases vegetative characters have been used in the keys, as these characters are always present and are best understood by the non-botanist. In some instances, however, floral characters must be used to make clear separations in the keys.

The keys have been compiled from a variety of sources and have been tested in the field and from herbarium material. They are of the non-indented dichotomous type as this type is most economical in printing. In each case two alternatives are offered, one of which should fit best the plant in hand. The basis of the primary divisions of the key is the growth habit of the plant. This means of division is used because the habit of the plant has an important relationship to its importance as harborage for mosquito larvae. Divisions in the key are made in as great measure as possible on vegetative characters as the layman is usually unfamiliar with the anatomy of the floral organs. An illustrated glossary of both vegetative and floral characters opens the way to a fuller working knowledge of the keys.

Desirable tools are a hand lens of about 10 magnifications and a millimeter scale, as in some cases details which require magnification are used in separating the species, and in many cases comparative size is used. It is suggested that if in the process of using the key some character seems ambiguous, the plant be looked for in both divisions. If after keying and comparison with the illustrations there is still doubt as to the identity of the plant, it should be checked with the more adequate descriptions of the larger manuals.

Each genus of the main key is illustrated by a drawing of a representative plant. The majority of these have been prepared especially for this guide by Garnet W. Jex, United States Public Health Service, but a large number have been borrowed from several publications. The author-source of these borrowed figures has been acknowledged elsewhere.

The nomenclature used in this guide is conservative and follows the best present day usage. In many cases the scientific names differ from those used by Small in his Manual of the Southeastern Flora, and in most places these discrepancies have been noted in the text.

Roots are used in the keying in only a few instances. Stems are not widely used except in the primary divisions of the keys. Whether the stem is woody or herbaceous is of great importance but is usually obvious. The habit of the stem, whether erect or reclining, lax or rigid, is also important, as is the presence or absence of hairs or other appendages.

Leaves show great diversity in many characters. The shape is perhaps most important. The state of division of the leaf, whether

compound or simple, dissected, lobed, or otherwise, is of only slightly less importance. The manner of attachment, whether alternate, opposite, or whorled, is a commonly used point of separation, as is the character of the leaf margin, whether hairy, toothed, etc. Other characters also much used are the nature of the apex of the leaf, the manner of venation, and such sensory characters as color, odor, and feel. Relative size is, as stated before, often used. Leaves are used in the majority of the key separations, and it is of primary importance that the leaf terminology be learned.

Flowers are more diverse than other plant structures, and the layman is often dismayed by the complex terminology. Only the absolutely necessary terms are used in the keys of this guide. Typically a flower consists of a stalk (pedicel or peduncle) upon the summit of which are borne several concentric whorls or cycles of floral parts. The outermost whorl is the calyx, made up of the ordinarily green sepals. Next outermost is the corolla, made up of petals which usually give color to the plant. Unfortunately petals are often lacking, and if only one whorl of accessory flower parts is present, they are termed sepals, even though sometimes colored. Within the petals is one or more whorls of pollen-bearing stamens, and within these is the innermost whorl consisting of one or more pistils which ultimately give rise to the seed. Sometimes stamens and pistils are found only in separate flowers, but usually they occur together. The stamens and pistils are usually termed the essential flower parts in contrast to the accessory sepals and petals. Flowers are borne either alone or in clusters known as inflorescences. Several types of inflorescences are illustrated in the glossary, small circles representing individual flowers, and lines the stalks.

In using the key several floral characters are used, color and size being of much importance. The shape and number of parts is also important as is the type of inflorescence. Also used is the extent of union of parts as sepals and petals are often partially or wholly united.

Two families of plants merit special attention as regards terminology. These are the grasses, Gramineae, and the sedges, Cyperaceae. Both are important and difficult aquatic groups. Below (figures 1 and 2) are diagrams of the morphology of the two families. In recognizing grasses the ligule of the leaf is of great importance. This structure, present at the inner base of the leaf where it joins the leaf-sheath, varies in size and nature but may usually be detected. The arrangement of grass leaves in two ranks or rows up and down the stem is also of great importance. Sedges may be distinguished by the absence of a ligule and the three-ranked arrangement of the leaves.

The arrangement of the flowers in the two groups is similar in some respects and different in others. Both have the small flowers or florets grouped one to many in spikelets. In the grasses each spikelet

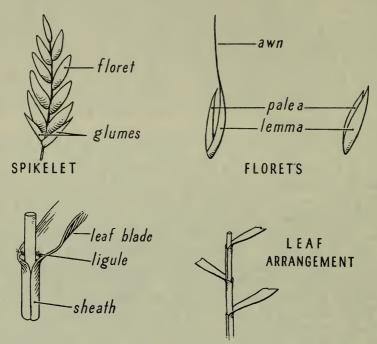


FIGURE 1.—A generalized diagram illustrating the morphology of grasses.

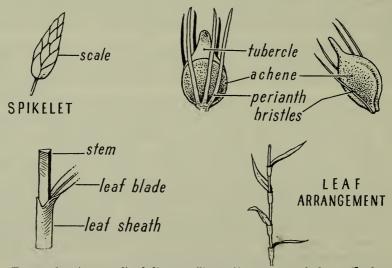


FIGURE 2.—A generalized diagram illustrating the morphology of sedges.

bears at the base two chaff-like empty bracts called the glumes, and each floret consists of two scales called the lemma and the palea with essential parts inclosed. In the sedges all of the scales or bracts are similar and are not designated by different terms. Important in identifying the sedges is the nature of the fruit or achene. The size, shape, presence or absence of a tubercle at the apex, the texture of the surface, and the nature of the perianth-bristles are used. Typical achenes are shown in the diagrams.

#### GLOSSARY OF BOTANICAL TERMS

ACHENE.—A small, dry, hard, indehiscent fruit.

ACUMINATE.—Tapering at the end (fig. 3).

ACUTE.—Terminating with a sharp point (fig. 4).

ADNATE.—United with or adhering to.

ALTERNATE.—Usually pertains to leaves. Not opposite each other but borne singly at different levels on the stem (fig. 5).

ANNUAL.—A plant of only one year's duration.

ANTHER.—The pollen-bearing portion of a stamen (fig. 6).



ARISTATE.—Bearing an awn or bristle at the tip (fig. 7). ATTENUATE.—Slenderly tapering; long drawn-out (fig. 8). Awn.—A bristle-like appendage (fig. 7).

AxIL.—The angle formed by a leaf with the stem (fig. 9).

AXILLARY.—Borne in the axils of the leaves.

BICONVEX.—Lenticular (fig. 10).

FIGURE 7. FIGURE 8. FIGURE 9. FIGURE 10.

BIDENTATE.—Bearing two teeth at tip (fig. 11).

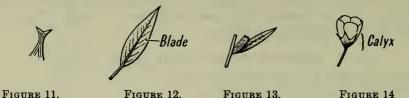
BILATERAL.—Having, or arranged upon, two corresponding sides.

BLADE.—The expanded portion of a leaf (fig. 12).

Bract.—A modified leaf usually subtending a flower or flowers (fig. 13).

BRACTLET.-A small bract.

CALYX.—The outermost circle of flower parts; made up of sepals (fig. 14).



CANCELLATE.—With a cellular-like surface (fig. 15).

CAPSULE.—A dry dehiscent fruit composed of more than one carpel.

CARPEL.—A simple pistil or one of the parts of a compound pistil (fig. 16).

CILIATE.—Fringed with hairs (fig. 17).

CILIOLATE.—Minutely ciliate.

CLAW.—The contracted stalk-like base of a petal (fig. 18).



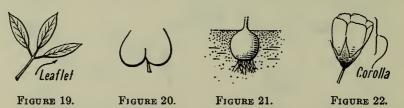
COMPOUND.—Composed of two or more similar parts united to form one whole; for instance, a leaf (fig. 19).

CORDATE.—Heart-shaped with the tip upward (fig. 20).

CORIACEOUS.—With leathery texture.

CORM.—A hard, bulb-like base of a stem (fig. 21).

Corolla.—The inner circle of flower parts: made up of petals which are often colored and showy (fig. 22)



COROLLA-TUBE.—Tubular structure formed by united petals (fig. 23).

CORYMB.—A type of flower cluster with a flat top (fig. 24).

CORYMBOSE.—With a corymb-like inflorescence.

Crown.—In Hymenocallis a white membrane uniting the filaments. (See fig. 17 of Group E.)

CUNEATE.—Wedge-shaped (fig. 25).

DECIDUOUS .- Falling off.

DECUMBENT.—Reclining but with the summit of the plant ascending.

DECURRENT.—Extending or running down on another structure, as a leaf on a stem or a tubercle on an achene (fig. 26).









FIGURE 23.

FIGURE 24.

FIGURE 25.

FIGURE 26.

Deltoid.—Shaped like an equilateral triangle or the Greek letter delta (fig. 27). Dichotomous.—Forking regularly by twos (fig. 28).

DISSECTED.—Cut into numerous very fine segments or divisions (fig. 29).

DISTICHOUS.—Coming off in two ranks (fig. 30).









FIGURE 27.

FIGURE 28.

FIGURE 29.

FIGURE 30.

DIVARICATE.—Diverging at a wide angle (fig. 31).

Dorsal.—Surface of an organ away from the central axis of the plant.

ECHINATE.-Prickly.

ELLIPTIC.—Pertains to shape (fig. 32).

EMERGENT.—Rooted to substratum; erect and extending upward out of water (fig. 33).

EMERSED.—Standing above and out of water (fig. 33).

ENTIRE.—Without teeth or other irregularities along the margin (fig. 32).







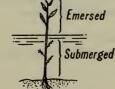




FIGURE 31.

FIGURE 32.

FIGURE 33.

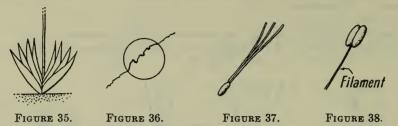
FIGURE 34.

EQUITANT.—Pertaining to leaves; coming off in two ranks, making the base appear flattened (fig. 35).

EROSE.—Appearing as if gnawed (fig. 36).

FASCICLE.—A cluster or bundle (fig. 37).

FILAMENT.—The part of the stamen which supports the anther (fig. 38).



FILIFORM.—Like a thread; long, slender, and round (fig. 39).

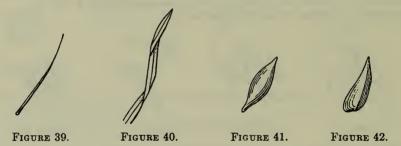
FLEXUOUS.—Alternately bent or twisted in different directions (fig. 40).

FLORET.—A small flower of the grasses. (fig. 1).

FOLIACEOUS.—Leaf-like.

FUSIFORM.—Spindle-shaped (fig. 41).

GIBBOUS.—Swollen on one side (fig. 42).



GLABROUS.—Without hairs.

GLAUCOUS.—Covered with a whitish or silvery bloom.

GLOBOSE.—Spherical (fig. 43).

GLUME.—A chaff-like bract at the base of a spikelet in the grasses (fig. 1).

Granular.—Appearing as if covered by small grains; with a grainy texture.

HASTATE.—Like sagittate but with lobes diverging (fig. 44).

HEAD.—A dense cluster of sessile or almost sessile flowers borne on a very short axis (fig. 45).

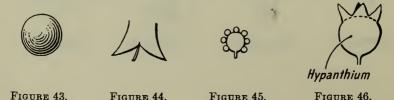
HERB.—A plant with no persistent woody stem above the ground.

HERBACEOUS .- Without woody tissues.

HISPID .- Stiff-hairy.

HISPIDULOUS.—Minutely stiff-hairy.

HYPANTHIUM.—Portion of the united calvx investing the fruit (fig. 46).



HYPOGYNUM.—In Scleria, a structure underneath and supporting the ovary or

IMBRICATE.—Spirally overlapping (fig. 47).

Incised.—Cut sharply, irregularly, and more or less deeply (fig. 48).

INDEHISCENT.—Remaining closed at maturity.

INFLATED.—Dilated or distended.

INFLORESCENCE.—The flowering part of a plant; a cluster of flowers.

INVOLUCRE.—A collection of bracts surrounding a flower cluster or head or sometimes a solitary flower.

Involute.—Rolled inwardly toward the midrib (fig. 49).

IRREGULAR.—Showing inequality in the arrangement of the floral parts; usually bilaterally symmetrical.

KEELED.—Possessing a central ridge as a boat (fig. 50).



FIGURE 50.

LACERATE.—Irregularly cut as if torn (fig. 51).

LAMELLIFORM.—Plate-like.

LANCEOLATE.—Shaped like a spear-head, broadest near base, tapering to apex, and several times as long as broad (fig. 52).

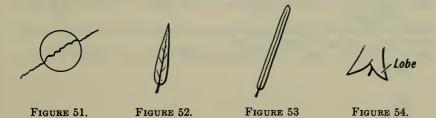
LEAFLET.—One of the segments of a compound leaf (fig. 19).

LEMMA.—The lower of the two bracts enclosing each floret in the grasses (fig. 1). LENTICULAR.—Lens-shaped, biconvex (fig. 10).

LIGULE.—A hairy or scarious projection at the point on the inner surface of a grass leaf where the sheath and blade meet (fig. 1).

LINEAR.—Long and narrow and with parallel sides (fig. 53).

LOBED.—With projection or divisions (fig. 54).



LONGITUDINAL.—Along the long axis of a structure.

MEMBRANOUS.—With membrane-like texture.

MIDRIB.—Main rib of normal leaf running from base to apex (fig. 55).

MUCRONATE.—Ending in an abrupt, fine, slender tip (fig. 56).

Nodes.—The places on the stems that normally bear leaves (fig. 57).

Nodose.—Knotty or knobby.

Oblanceolate.—Lanceolate in outline but with the broadest part toward the apex (fig. 58).



FIGURE 55.



FIGURE 56.



FIGURE 57.



FIGURE 58.

Oblong.—Longer than broad and with nearly parallel sides (fig. 59).

Obovate.—Ovate in outline but with the broadest portion toward the apex (fig. 60).

Obpuramidal.—Shaped like a pyramid with the broad end uppermost (fig. 61). Obtuse.—Blunt or rounded at the tip (fig. 62).



FIGURE 59.



FIGURE 60.



FIGURE 61.



FIGURE 62.

OCREA.—A tubular sheath present on the stem just above the base of the leaves of docks and smartweeds. It is formed of the fused stipules (fig. 63).

Ocreolae.—Small ocrea-like structures on the rachis of the flower clusters in *Polygonum*.

Opposite.—Coming off opposite each other at the same level on the axis (fig. 64). Orbicular.—Circular or round (fig. 65).

Ovary.—The basal portion of the pistil in which the seeds or ovules are borne (fig. 66).



FIGURE 63.



FIGURE 64.



FIGURE 65.



FIGURE 66.

OVATE.—Having an outline like that of an egg, with the broadest part downward (fig. 67).

Ovoid.—Egg-shaped; see ovate.

Panicle.—An irregularly compound flower cluster with stalked flowers (fig. 68).

Paniculate.—With a panicle-like inflorescence.

Papillose.—Bearing small pimple-like projections.

PEDICEL.—The stalk of a single flower (fig. 69).

PEDUNCLE.—The stalk which supports a flower cluster or a solitary flower.

Pelitate.—Petiole attached not at margin of leaf but in the middle of the lower surface (fig. 70).









FIGURE 67.

FIGURE 68.

FIGURE 69.

FIGURE 70.

PERENNIAL.—A plant of more than two years' duration.

PERIANTH.—The calyx and corolla taken together (fig. 71).

Perianth-bristles.—Rudimentary perianth parts in sedges (fig. 2).

Perigynium.—The inflated sac which contains the ovary or fruit of Carex.

Persistent.-Not falling off or away.

Petal.—A member of the inner circle of flower parts; often colored and showy (fig. 72).

PETIOLE.—The stalk of a leaf (fig. 73).

PISTIL.—The seed-bearing part of a flower (fig. 74).







FIGURE 72.



FIGURE 73.



FIGURE 74.

PISTILLATE.—With or pertaining to pistils.

POLLEN.—The usually yellow grains contained in the anther.

PROCUMBENT.—Lying or crawling along the ground.

PROLIFEROUS.—Producing off-shoots.

PUBERULENT.-With minute hairs.

Pubescent.—Covered with hairs, often short and downy (fig. 75).

Punctate.—With small dots, which can often be seen only with a lens (fig. 76).

RACEME.—A flower cluster with the flowers stalked and coming off a common and more or less elongated axis (fig. 77).

RACHILLA.—A secondary inflorescence rachis.

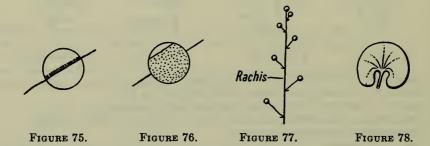
RACHIS.—The axis of an inflorescence (fig. 77).

RAY-FLOWERS.—The flat marginal flowers of the head in the Compositae.

RECURVED.—Curved backwards or toward base.

REGULAR.—Pertaining to flowers; flowers radially symmetrical.

RENIFORM.—Kidney-shaped (fig. 78).



RETICULATE.—With a network-like surface (fig. 79).

REVOLUTE.—Appearing as if rolled back from the margins (fig. 80).

RHIZOME.—A prostrate or underground stem.

ROSETTE.—With the leaves clustered symmetrically around the base of the stem or scape (fig. 81).

SAGITTATE.—Like an arrowhead, with the lobes turned downward (fig. 82).



FIGURE 82.

FIGURE 79. FIGURE 80. FIGURE 81.

SCABROUS .- Rough.

SCAPE.—A naked peduncle rising from the ground (fig. 81).

SEPAL.—A member of the outermost circle of flower parts (fig. 83).

Septate.—Possessing partitions or septa.

Septum.—A partition (pl. septa).

SERRATE.—Toothed like a saw (fig. 84.)

SERRULATE.—Minutely sharp-toothed.

Sessile.—Without a stalk of any kind. May refer to leaves, bracts, flowers, or flower clusters.

SETOSE.—Bristly.

Shrub.—A woody plant smaller than a tree and often with several stems.

SIMPLE.—Not compound.

Sinus.—A cleft or recess between two lobes (fig. 85).

Spathe.—Leaf-like structure more or less enclosing a fleshy inflorescence, particularly in the Araceae (fig. 86).







FIGURE 84.



FIGURE 85.



FIGURE 86.

SPATULATE.—Pertains to shape (fig. 87).

SPIKE.—A flower cluster with the flowers sessile along a common more or less elongated axis (fig. 88).

SPINELET.—A small or secondary spike as in the grasses and sedges (fig. 1 and 2). SPINULOSE.—Minutely spiny.

Spur.—A hollow sac-like or tubular extension of some part of a flower (fig. 89). Stamen.—The pollen-bearing organ of the flower (fig. 90).



FIGURE 87.

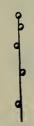


FIGURE 88.



FIGURE 89.



FIGURE 90.

STAMINATE.—With or pertaining to stamens.

STIGMA.—The sticky portion of the pistil, usually terminal, upon which the pollen is deposited (fig. 91).

STIPE.-A stalk.

STIPITATE.—Possessing a stipe.

STIPULE.—An appendage at the base of the petiole of a leaf; normally occurring in pairs (fig. 92).

STOLONIFEROUS.—Producing runners from the base.

STYLE.—The part of the pistil connecting the stigma and the ovary. Generally it is attenuated (fig. 91).

STYLE-APPENDAGES.—Petaloid wings on the styles of Iris.

Subcordate.—Somewhat heart-shaped (fig. 93).

Subglobose.—Almost spherical.

SUBTEND.—To come out below.

Subulate.—Shaped like an awl (fig. 94).



Stipule





FIGURE 91.

FIGURE 92.

FIGURE 93.

FIGURE 94.

Tomentose.—Densely woolly.

Tree.—A large single-stemmed woody plant; has been defined as being over 6 meters tall and over 1 decimeter in diameter.

TRUNCATE.—Ending abruptly as if cut off (fig. 95).

Tubercle.—An enlarged, persistent style base often found on the summit of the fruits of sedges (fig. 96).

TURBINATE.—Top-shaped or conical with the broad end uppermost (fig. 97).

UMBEL.—A type of flat-topped flower cluster (fig. 98).









FIGURE 95.

FIGURE 96.

FIGURE 97.

FIGURE 98.

UNDULATE.—With a wavy margin (fig. 99).

VILLOUS.—Possessing long soft hairs.

Whork.—An arrangement of leaves or other parts in which they come off several at the same level around the stem (fig. 100).





FIGURE 99.

FIGURE 100.

#### KEY TO GROUPS

1. Shrubs or trees	roup A, p. 15.
1. Vines or herbs 2.	
2. Vines G	roup B, p. 24.
2. Herbs 3.	
3. Plants free-floating G	roup C, p. 25.
3. Plants attached to substratum4.	
<ol> <li>Plants floating, submerged, or forming mats on G or just above the surface of the water.</li> </ol>	Froup D, p. 28.
4. Plants erect and emergent; rooted to the sub- 5. stratum and extending upward out of the water.	
5. Plants without leaves or with long narrow leaves at G	roup E, p. 38.
least 12 times as long as broad and usually grass or rush-like.	
5. Plants with shorter, broader leaves G	Group F, p. 47.

#### KEY TO GROUP A

1. Leaves very narrow, often needle-like	2.
1. Leaves with expanded blades	4.
2. Shrub with yellow flowers (fig. 1)	Hypericum, p. 123.
2. Cone-bearing trees	3.
3. Needles long and two to several in fascicles (fig. 2)	Pinus, p. 68.
3. Needles shorter, arranged in two ranks along twig, or	Taxodium, p. 68.
sometimes appressed to twig; not in fascicles (fig. 3).	

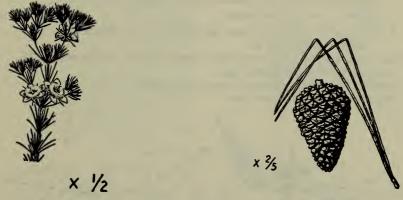


FIGURE 1.

FIGURE 2.



	4.	Leaves opposite	5.
		Leaves alternate or borne irregularly	
5.	. Leaves	simple	6.
5.	. Leaves	compound	11.
	6.	Leaves lobed (fig. 4)	Acer, p. 122.
	6.	Leaves not lobed	7.
7.	. Shrubs	, often very low; leaves with tiny semi trans-	Hypericum, p. 125.
	pare	nt dots visible with hand-lens; flowers showy	
	yello	w (fig. 5).	
P7	CIL 1		0

7. Shrubs or small trees; leaves without dots; flowers not showy yellow.



FIGURE 4.

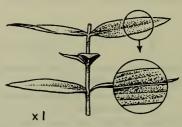


FIGURE 5.

- 8. Stems sturdy and erect, leaves elliptic to wider; flowers not showy purplish.
- Decodon, p. 125. 8. Stems weakly arching; leaves lanceolate; flowers showy purplish (fig. 6).
- Forestiera, p. 133. 9. Leaves remotely toothed, acuminate at apex; flowers appearing before the leaves (fig. 7).
- 9. Leaves entire, acute but not acuminate; flowers appear-10. ing after leaves are on the plant.

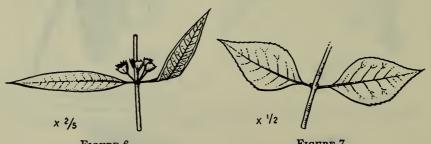


FIGURE 6.

FIGURE 7.

- Flower clusters conspicuous because of large, leaf- Pinckneya, p. 138.
   like, pink sepals (fig. 8).
- 10. Flowers white in stalked globose clusters; fruits Cephalanthus, p. 138. aggregated in spherical clusters (fig. 9).

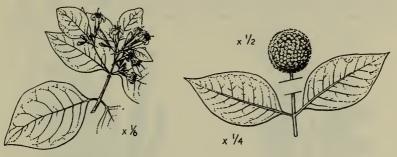


FIGURE 8.

FIGURE 9.

11.	Trees	12.
11.	Shrub (fig. 10)	Sambucus, p. 138.
	12. Leaflets usually 3; very prominently toothed	Acer, p. 122.
	(fig. 11).	
	12. Leaflets usually more than 3; not prominently	Fraxinus, p. 133.
	toothed (fig. 12).	







FIGURE 11.



FIGURE 12.

13. Leaves simple	<b></b> 17.
13. Leaves compound	14.
14. Trees	16.
14. Shrubs	15.
15. Plant thorny; leaflets not over 9 usually 7 o	or 5 (fig 13) _ Rosa, p. 119.
15. Plant not thorny; leaflets more than 11 (fi	ig. 14) Amorpha, p. 120.
× 1/4	
	× <sup>2</sup> / <sub>5</sub>
FIGURE 13.	FIGURE 14.
<ul><li>16. Leaflets many and small, usually prominently thorny (fig. 15).</li><li>16. Leaflets fewer and large, usually thorny (fig. 16).</li></ul>	· · ·
× 1/4	× 1/6
FIGURE 15.	Figure 16.
<ul> <li>17. Leaves aromatic when crushed</li> <li>18. Leaves with small, orange wax lower surface when examined leaves usually prominently tooth</li> </ul>	glands on Myrica, p. 112. with lens;

18. Leaves without wax glands below; leaves 19.

entire or nearly so.

- Leaves, at least the younger ones, densely hairy or Persea, p. 124. wooly beneath (fig. 18).
- 19. Leaves not wooly beneath, glabrous or nearly so\_\_\_\_\_ 20.



- 20. Leaves silvery (glaucous) beneath (fig. 19)\_\_ Magnolia, p. 119.
- 20. Leaves not silvery beneath 21.
- Fruit oval, longer than broad; leaves mostly over Benzoin, p. 124.
   6 cm. long (fig. 20).
- 21. Fruit globose, about as long as broad; leaves mostly Glabraria, p. 124. less than 6 cm. long (fig. 21).



FIGURE 19.

FIGURE 21.

FIGURE 20.

22. Leaves distinctly toothed	27.
22. Leaves entire or nearly so	23.
23. Trees with swollen bases; fruit a drupe, longer than	
wide (fig. 22).	
23. Shrubs or small trees; fruit, if not dry, globose	24.
24. Leaves entire; fruit dry	25.
24. Leaves usually with a few remote teeth above	Ilex, p. 121.
the middle or at least bristle-tipped; fruit	
a red or black berry (fig. 23).	





FIGURE 22.

FIGURE 23.

- 25. Leaves leathery, broad, and with a conspicuous vein Desmothamnus, p. 132. running just inside the margin (fig. 24).
- 25. Leaves not leathery or broad, but oblong and with no 26. intramarginal vein.
  - 26. Flower clusters lateral; fruit not winged Cyrilla, p. 121. (fig. 25).
  - Flower clusters terminal; fruit winged (fig. Cliftonia, p. 121.
     26).



FIGURE 24.

FIGURE 25.

FIGURE 26.

27. Branches spiny; fruit apple-like (fig. 27)  27. Branches not spiny; fruit not apple-like  28. Bark falling away in reddish, papery layers	28.
(fig. 28).  28. Bark not falling away in papery layers	29,



FIGURE 27.

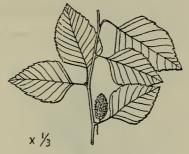


FIGURE 28.

Gordonia, p. 124.

- Low, brittle shrub with wood lighter than cork; green Stillingia, p. 121.
   parts with a milky sap (fig. 29).
- Shrubs or trees, not brittle or lighter than cork; sap 30. not milky.
  - 30. Leaves leathery; evergreen; flowers showy, white, large (6 cm. across); tree (fig. 30).
  - Leaves not leathery or evergreen (except one species of low-shrubby Leucothoë); flowers not individually large.

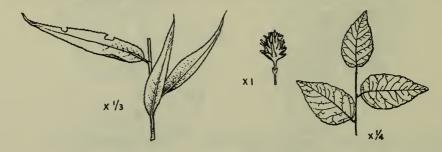


FIGURE 29.

x 1/2

FIGURE 30.

- Small trees or shrubs; flowers not white or showy and appearing in early spring.
- 31. Shrubs; flowers white in showy racemes, appearing 34. usually in late spring or summer.
  - 32. Leaves over 4 times as long as broad (fig. 31) \_\_ Salix, p. 112.
  - 32. Leaves scarcely over 2 times as long as broad.\_ 33.
- 33. Buds covered with overlapping scales; fruit warty Planera, p. 113. (fig. 32).
- 33. Buds with a single scale; fruit cone-like (fig. 33) \_\_\_\_ Alnus, p. 113.



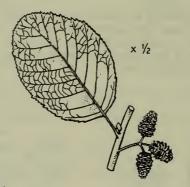


FIGURE 31.

FIGURE 33.

FIGURE 32.

- 34. Petals not united; anthers not awned\_\_\_\_\_ 35.
- 34. Petals united to form tubular corolla; anthers Leucothoë, p. 132. with prominent awns at tip (fig. 34).
- 35. Sepals not pubescent or only slightly so; fruit a linear, Itea, p. 119. 2-grooved capsule; leaves elliptic (fig. 35).
- 35. Sepals copiously pubescent; fruit a subglobose, 3- Clethra, p. 132. valved capsule; leaves cuneate (fig. 36).



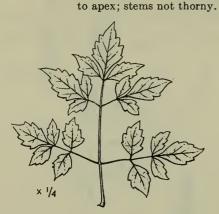
FIGURE 34.

FIGURE 36.

FIGURE 35.

#### KEY TO GROUP B

1.	Leaves	compound (fig. 1)	Ampelopsis, p. 122.
1.	Leaves	simple	2.
	2.	Leaves with several veins running from base to	Smilax, p. 109.
		apex; stems often thorny (fig. 2).	
	2	Leaves without several voine running from hase	3



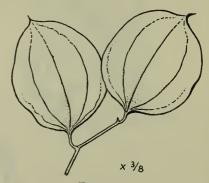


FIGURE 1.

(fig. 4)

FIGURE 2.

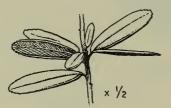






FIGURE 4.

- Leaves alternate, not prominently toothed, subcordate Breweria, p. 134.
   at the base (fig. 5).
- 5. Leaves opposite, with wavy margins or angularly Mikania, p. 139. toothed (fig. 6).

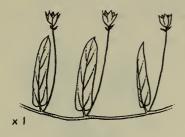






FIGURE 6.

#### KEY TO GROUP C

- Plants very small; seldom over a centimeter along any 2. dimension.
- Plants large; usually measuring at least 0.5 decimeter 8 along some dimension.
  - Plant body dichotomously 2-lobed, or repeatedly 3. dichotomously branched.
  - 2. Plant body not dichotomously branched and if 2- 4. lobed not equally so.
- 3. Divisions of plant body fine and many; plant body Riccia, p. 67. usually floating below surface (fig. 1).
- 3. Divisions of plant body coarse, 2-lobed; floating on Ricciocarpus, p. 67. surface (fig. 2).



FIGURE 1.



FIGURE 2.

- 4. Plants floating on surface................................ 5.
- 4. Plants floating just below water surface; plant Wolffiella, p. 103. body made up of a clump of short filaments (fig. 3).
- 5. Plant body of small overlapping scales (fig. 4) \_\_\_ Azolla, p. 67.
- Plant body simple or compound, made up of rounded 6. floating leaves.



FIGURE 3.

FIGURE 4.

- 6. Plants simple, extremely minute, appearing as Wolffia, p. 103. grains on surface of water (fig. 5).
- Plants compound, made up of several roundedoblong disk-like bodies, floating on surface of water.
- 7. Plant body inconspicuously nerved, rootlets 1 per disk Lemna, p. 103. (fig. 6).
- 7. Plant body conspicuously nerved, rootlets 2 to several Spirodela, p. 104. per disk (fig. 7).

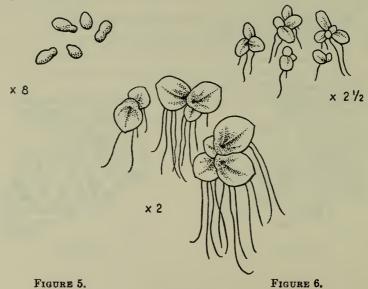


FIGURE 7.

- Leaves broad and blade-like, sometimes inflated 9. near base.
- Leaves (plant body in Riccia) narrow or finely 11. divided.
- 9. Leaves large and dilated with inflated petioles (fig. 8)\_9. Leaves normally expanded.\_\_\_\_\_\_
  - 10. Leaves wide to the base, without petioles (fig. 9)
    - 10. Leaves mostly differentiated into blades and petioles (fig. 10).

Eichhornia, p. 107.

Pistia, p. 103.

Limnobium, p. 76.

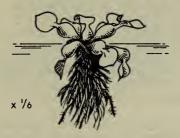


FIGURE 8.



FIGURE 9.

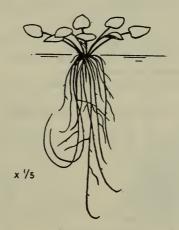


FIGURE 10.

- 11. Plant body repeatedly dichotomously branched (fig. 1). Riccia, p. 67.
- 11. Leaves not dichotomously branched \_\_\_\_\_\_ 12.
  - 12. Leaves entire not dissected or bearing blad- Anacharis, p. 75. ders, and whorled (fig. 11).
  - 12. Leaves dissected and bearing bladders (fig. 12) \_ Utricularia, p. 137.

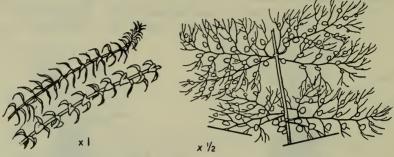


FIGURE 11.

FIGURE 12.

#### KEY TO GROUP D

- 1. Vegetative body formed of floating stems without leaves\_ 2.
- 1. Vegetative body formed of stems and leaves\_\_\_\_\_ 4.
  - 2. Branches of stem bearing small bladders; Utricularia, p. 137. flowers showy, purple (fig. 1).
  - 2. Stem or branches not bearing bladders; 3. flowers absent or inconspicuous.
- 3. Plant body made up of smooth, proliferating stems Eleocharis. p. 88.
- 3. Plant body made up of stems bearing whorled, brittle Chara, p. 67. branches (fig. 3).

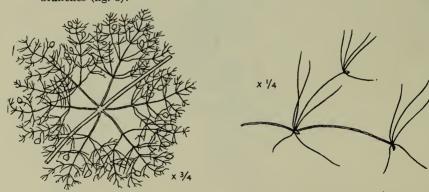
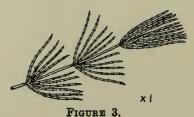


FIGURE 1.

FIGURE 2.



4. P	lants bearing linear, sometimes long and
	ribbon- or thread-like submerged leaves,
	or compound submerged leaves with nar-
	row divisions; plants often entirely sub-
	merged, with or without floating or emersed
	leaves.

4. Plants not bearing submerged linear, ribbonor thread-like leaves or narrowly segmented submerged leaves; plants often not entirely submerged; submerged leaves, if any, similar to the floating or emersed leaves.

**2**6.

13.

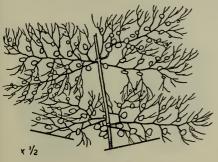
5.

5. Submerged leaves bearing bladders; flowers irregular, showy yellow or purple (fig. 4).

Utricularia, p. 137.

- 5. Submerged leaves not bladder bearing; flowers regular 6.
  - Submerged leaves compound, made up of narrow segments or leaflets.
  - 6. Submerged leaves simple, made up of a single narrow blade.
- - 8. Submerged leaves scattered along almost the 9. entire length of the stem; flower stalks not inflated.
  - 8. Submerged leaves gathered along a few centimeters of the stem; flower stalks inflated (fig. 5).

Hottonia, p. 132.





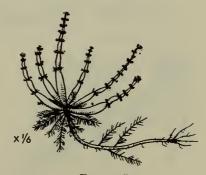


FIGURE 5.

- 9. Submerged leaves whorled, stems usually very lax Myriophyllum, p. 129. (fig. 6).
- 9. Submerged leaves scattered, stems not so lax\_\_\_\_\_\_10.
  - 10. Submerged leaves with simple divisions **Proserpinaca**, p. 129. (fig. 7).
  - Submerged leaves with leaflets again divided Neobeckia, p. 119. (fig. 8).

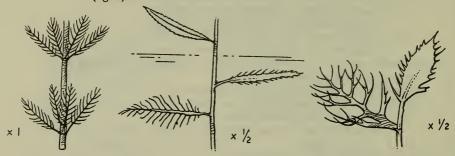


FIGURE 6.

FIGURE 7.

FIGURE 8.

- 11. Submerged leaves alternate or irregularly borne Ranunculus, p. 118. (fig. 9).
- 11. Submerged leaves borne opposite each other on stem 12. or whorled.
  - 12. Submerged leaves opposite; leaflets not Cabomba, p. 117. toothed (fig. 10).
  - 12. Submerged leaves whorled; leaflets minutely Ceratophyllum, p. 116. toothed on one edge (fig. 11).



FIGURE 9.

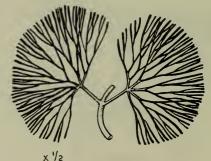


FIGURE 10.

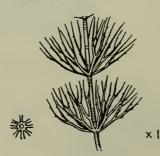


FIGURE 11.



13. Submerged leaves long as	nd ribbon-like, at 14.
least 3 mm. wide.	
13. Submerged leaves not	•
thread-like but if wider	than 3 mm., less
than 2.5 cm. long.	10
14. Leaves all borne from one point	
14. Leaves scattered along the stem 15. Leaves without midribs ev	
ined against transmitt	· •
yellow (fig. 12).	ed light, howers
15. Leaves with midribs evide	nt when examined Potamogeton, p. 69.
against light; flowers in	3
yellow (fig. 13).	
, c (g)	
/ x 2	/// x2
\ / ""	
Figure 12.	Figure 13.
FIGURE 12.	rigure 15.
<ul><li>16. Leaf, when examined with hand len tral dense and a peripheral less de</li><li>16. Leaf, when examined with hand le zones (fig. 15).</li></ul>	nse zone (fig. 14).
	<b>a</b>
× 3/4	× 3/4
	X = 74
Figure 14.	FIGURE 15.
	base or from 'a Isoetes, p. 68.
single point; base of leav	es with spore-sacs
(fig. 16)	D1
17. Leaves borne along stem	
18. Leaves opposite or whorled	
18. Leaves alternate or singly borne or	
19. Leaves opposite, but som	
whorled because of fascicl	
axils of the opposite leave	
IN LAUVAL WAARIAA	

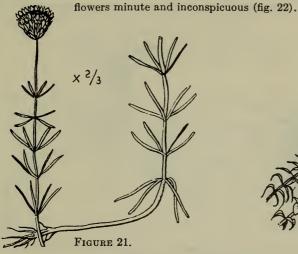
32 PUBLIC HEALTH BULLETIN NO. 286 20. All leaves long and narrow\_\_\_\_\_ 21. 20. Upper leaves shorter and broader (fig. 17)\_\_\_\_\_ Callitriche, p. 121. FIGURE 16. FIGURE 17. 21. Plants lax, not rooting along the stem\_\_\_\_\_ 22. 21. Plants stiff, rooting along the stem; leaves stiff and often in fascicles (fig. 18). Juncus, p. 107. 22. Leaves with dilated bases (fig. 19)\_\_\_\_\_\_ Najas, p. 71. 22. Leaves with narrow bases (fig. 20)\_\_\_\_\_\_ Zannichellia, p. 71. x 1/2 FIGURE 19. FIGURE 18.

x 3/4

FIGURE 20.

23. Leaves 4-6 in whorls, blades very narrow; Sclerolepis, p. 139. flowers conspicuous, purple (fig. 21)

23. Leaves usually 3 in whorls (sometimes 4); Anacharis, p. 75.





- 24. Leaves borne separately along stem; flowers incon- 25.
- spicuous. 24. Leaves crowded on stem; flowers 3-petaled, pink and Mayaca, p. 104. fairly conspicuous (fig. 23).
  - 25. Leaf-base apparently inflated (fig. 24)\_\_\_\_\_ Ruppia, p. 71.
  - 25. Leaf-base narrow, sometimes with stipules Potamogeton, p. 69. (fig. 25).



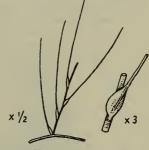


FIGURE 24.



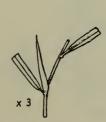
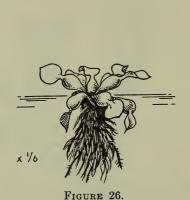
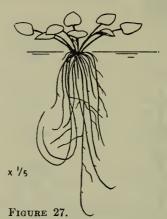


FIGURE 25.

26. Leaves in rosettes which float on the surface of the water 27. 26. Leaves not in rosettes floating on the surface of the water 28. 27. Petioles of leaves greatly inflated (fig. 26) \_\_\_ Eichhornia, p. 107. 27. Petioles not inflated (fig. 27)\_\_\_\_\_\_ Limnobium, p. 76.





28. Leaves arising from points along a horizontal stem, this stem being either buried under the substratum or lying procumbent along it.

28. Leaves from lax stems which float in the water with 34.

the leaves. 29. Leaves peltate\_\_\_\_\_ 30.

29. Leaves not peltate\_\_\_\_\_ 32. 30. Leaves round\_\_\_\_\_ 31.

30. Leaves elliptic, the petiole and under surface coated Brasenia, p. 117. with a thick jelly-like material (fig. 28).

> 31. Leaves small, about 8 cm. in diameter or less; toothed or lobed (fig. 29).

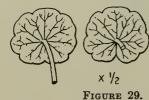
31. Leaves large; more than 20 cm. in diameter; margins entire and impossible to wet leaf (fig. 30).

Hydrocotyle, p. 130.

Nelumbo, p. 117.



FIGURE 28.







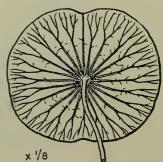


FIGURE 30.

32. Leaves small, mostly less than 15 cm. long, heart- Nymphoides, p. 134. shaped; flowers white and less than 2.5 cm. across (fig. 31).

32. Leaves large, mostly more than 15 cm. long; flowers white or yellow, more than 5 cm. across.

33. Flowers white; leaf-blade round (fig. 32)\_\_\_\_ Nymphaea, p. 117.

33. Flowers yellow; leaf-blade longer than wide, or approaching an orbicular shape (fig. 33).

33.

Nuphar, p. 116.

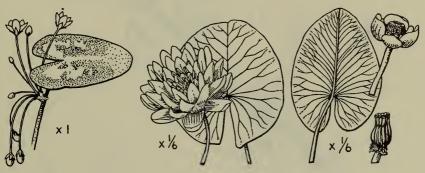


FIGURE 31.

FIGURE 32.

FIGURE 33.

34. Leaves round, often peltate; the long petiole attached Hydrocotyle, p. 130. near center of leaf (fig. 34). 34. Leaves usually longer than broad; petiole, if present,

not attached at center of leaf.

35. Leaves broadened and often clasping at the base.

35. Leaves narrowed at the base\_\_\_\_\_ 38.

36. Plants aromatic when crushed; flowers blue (fig. 35)\_\_ Hydrotrida, p. 135.

36. Plants not aromatic when crushed; flowers white\_\_\_\_ 37.

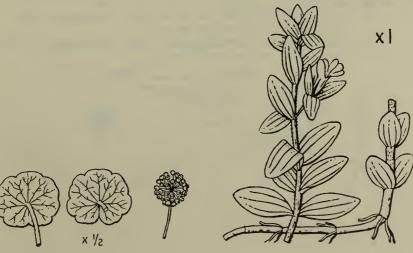


FIGURE 34.

FIGURE 35.

- 37. Stem finely pubescent; flowers 3-4 mm. long Herpestris, p. 135. (fig. 36).
- 37. Stem not finely pubescent; flowers not more Micranthemum, p. 136. than 1.5 mm. long (fig. 37).

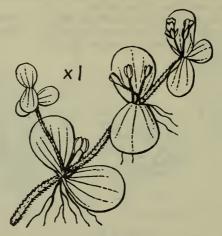


FIGURE 36.

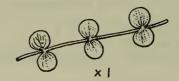
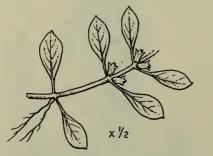


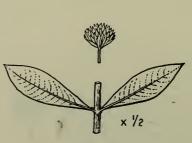
FIGURE 37.

38. Leave	s alternate		40.
3	9. Flowers solitary in	the axils of the leaves;	Ludwigia, p. 126.
	leaves less than 3	.5 cm. long (fig. 38).	
3	9. Flowers in stalked	head-like spikes; leaves	Alternanthera, p. 115.
	over 3.5 cm. long	(fig. 39).	



38. Leaves opposite....

FIGURE 38.



... 39.

FIGURE 39.

- 40. Leaves grass-like, continued as a sheath below base of Hydrochloa, p. 82. blade (fig. 40).
- 40. Leaves not grass-like and not continued as a sheath be- 41. low the base of the blade.
  - 41. Stems with a sheath (ocreae) just above attach- Polygonum, p. 114. ment point of leaf; flowers individually small, white to pink (fig. 41)
  - 41. Stems with no sheaths \_\_\_\_ 42.

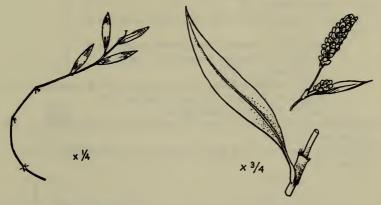


FIGURE 40.

FIGURE 41.

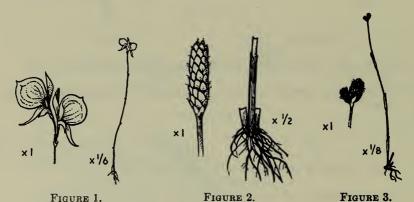
- 42. Flowers large, showy yellow; fruit a 4-angled capsule Jussiaea, p. 128. (fig. 42).
- 42. Flowers small, inconspicuous; fruit a 3-angled nutlet Proserpinaca, p. 129. (fig. 7).



FIGURE 42.

## KEY TO GROUP E

- 1. Plants without leaves, consisting only of naked stems, 2. sometimes with bladeless leaf sheathes, often bearing a flower cluster at or near top. 1. Plants bearing leaves \_\_\_\_\_ 12.
- 2. Plants surmounted by a flower or fruit clus- 3.
  - 2. Plants without flowers 7.
- 3. Flower cluster terminal
- 3. Flower cluster appearing lateral with stem extending 6. beyond.
  - 4. Leaf-sheaths present; flower cluster consisting 5. of groups of flowers concealed by overlapping scales.
  - 4. No leaf-sheaths present; flower cluster con- Utricularia, p. 137. sisting of 1 to several showy, irregular, yellow, or purple blossoms (fig. 1).
- 5. Leaf-sheaths present only at base of stem; flowers in Eleocharis, p. 88. in one group (fig. 2).
- 5. Leaf-sheaths scattered along stem; flowers in several Fuirena, p. 93. groups (fig. 3).



- 6. Flowers or fruits hidden by overlapping scales Scirpus, p. 91. (fig. 4).
- Flowers or fruits individually manifest; parts Juncus, p. 107. in threes (fig. 5).

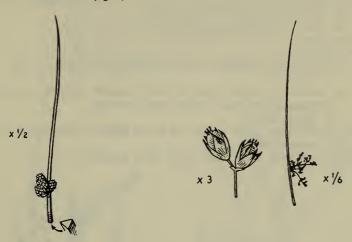


FIGURE 4.

FIGURE 5.

7. S	tems round in	cross-section		8.	
7. S	tems angled in	cross-section		10.	
	8. Stems l	arge and long (1 me	ter or more)	Scirpus, p. 91	
	8. Stems s	horter		9.	
9. S	heaths at base	of stem with edges u	nited to form tul	e Eleocharis, p.	88.
	(fig. 6).				
9. S	heaths at base	of stem merely over	lapping (fig. 7).	Juncus, p. 10	7.







FIGURE 7.

10. Stems 4-angled	Eleocharis, p. 88.
10. Stems 3-angled	11.
11. Stems long (½ meter or more)	
11. Stems shorter	
12. Leaves all basal or from one point	13.
12. Leaves distributed along stem	24.
13. Leaves round	14.
13. Leaves flattened	15.
14. Leaves from enlarged, spore-containing bases	Isoetes, p. 68.
(fig. 8).	
14. Leaves (in reality stems) not from enlarged,	Eleocharis, p. 88.
spore-bearing bases; bases with a tubular	
sheath (fig. 6).	

- 15. Plants small, mostly under 1 dm. tall; leaves filiform, Myosurus, p. 118. or very narrowly linear (fig. 9).
- 15. Plants mostly over 1 dm. tall; leaves more broadly 16. linear.

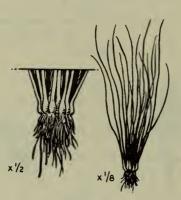


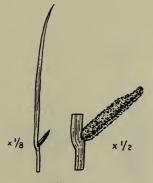
FIGURE 8.



FIGURE 9.

16. Leaves keeled or folded	17.
16. Leaves flat and not keeled	19.
7. Plants aromatic when crushed (fig. 10)	Acorus, p. 102.
7. Plants not aromatic	18.
18. Flowers violet, over 3 cm. across; leaves equit-	Nemastylis, p. 110.
ant at base; that is coming in two ranks,	•
making the base of the plant appear flat-	
tened (fig. 11).	
18. Flower inconspicuous and hidden by overlap-	Cyperus, p. 87.

18. Flower inconspicuous and hidden by overlap- Cyperus, p. 87. ping scales (fig. 12).





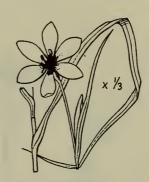


FIGURE 11.



FIGURE 12.

- 19. Leaves equitant at base; that is, coming in two ranks 20. making the base of the plant appear to be flattened.
- 19. Leaves coming out from all sides of base\_\_\_\_\_ 21.
  - Leaves large (1 cm. wide or wider); flowers Iris, p. 110.
     very showy (fig. 13.)
  - 20. Leaves smaller, rigid; small yellow flowers Xyris, p. 104. gathered in dense heads at top of naked stalk, each subtended by a scale-like bract (fig. 14).



FIGURE 13.



FIGURE 14.

- - 22. Leaves from base of scape bearing evident Sagittaria, p. 72. white flowers in racemes; roots without cross-constrictions (fig. 16).

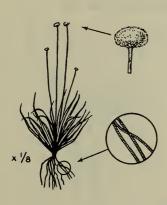






FIGURE 16.

- Flowers with filaments connected by a funnel-like Hymenocallis, p. 109 membrane (crown) (fig. 17).
- 23. Flowers with free filaments (fig. 18) ..... Crinum, p. 109.

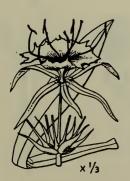


FIGURE 17.

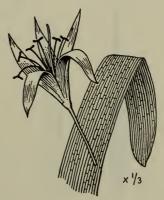


FIGURE 18.

- 24. Stem usually triangular in cross-section Cyperaceae, p. 84. particularly near base (edges sometimes rounded); leaves 3-ranked, flowers in close clusters and concealed by overlapping
- Stems round in cross-section, leaves not 3- 25.
   ranked.
- Leaf with a ligule at base (junction of leaf and sheath) Graminae, p. 76.
   (fig. 19).
- 25. Leaf without ligule\_\_\_\_\_ 26.
  - 26. Leaves with sheaths at base\_\_\_\_\_ 27.
  - 26. Leaves without definite sheaths, but bases 29. sometimes sheathing.
- 27. Leaves narrow, mostly less than 1 cm. (fig. 20)\_\_\_\_\_ Juncus, p. 107.
- 27. Leaves broader\_\_\_\_\_\_28.

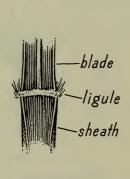






FIGURE 20.

- 28. Sheaths abruptly contracted to blade of leaf; Typha, p. 68. leaves without keels (fig. 21).
- 28. Sheaths narrowed to blade; leaves with keels Sparganium, p. 68. (fig. 22).

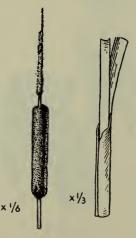


FIGURE 21.

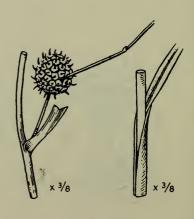
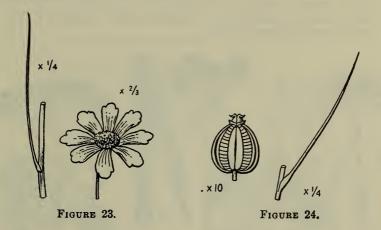


FIGURE 22.

29.	Leaves round	30.
29.	Leaves flat	32.
	30. Flowers few, showy, pinkish purple (fig. 23)	Coreopsis, p. 140.
	30. Flowers many in compound umbels, incon-	31.
	spicuous.	
31.	Fruit flattened laterally; fruit not winged (fig. 24)	Ptilimnium, p. 131.
31.	Fruit flattened dorsally; fruit prominently winged	Oxypolis, p. 131.
	(fig. 25).	



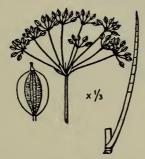
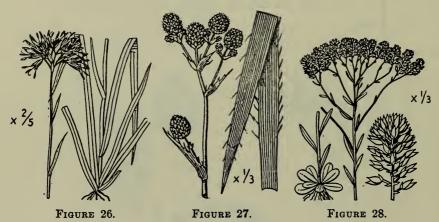


FIGURE 25.

32. Leaves keeled (fig. 10)	
32. Leaves not keeled	33.
33. Root red (fig. 26)	
33. Root not red	34.
34. Leaves equitant at base; flowers few and	Iris, p. 110.
showy purple or sometimes white (fig. 13).	
34. Leaves not equitant at base of plant	35.
35. Flowers white in dense button-like heads; leaves	Eryngium, p. 130.
bristly-margined (fig. 27).	

35. Flowers yellow, not in button-like heads nor with Polygala, p. 120. bristly-margined leaves (fig. 28).



## KEY TO GROUP F

- - Leaves deeply lobed other than at base of 15. blade.
  - Leaves not deeply lobed except sometimes at 3.
     base of blade.
- Leaves definitely lobed at base of blade; that is, lobes 20.
   extending below the junction of the petiole and the leaf.
- Leaves not lobed but sometimes sessile and clasping 30. at the base.
  - 4. Leaves fern-like; plant not bearing flowers... 5.
  - 4. Leaves not fern-like; plants bearing flowers \_\_ 6.
- Spores borne in sacs on lower leaf surface; divisions of Anchistea, p. 67.
   the leaf small, less than 2 cm. long (fig. 1).
- 5. Spores borne on terminal modified leaves; divisions of Osmunda, p. 67. the leaf larger, more than 2 cm. long (fig. 2).

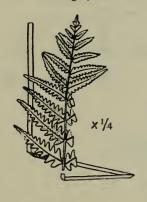




FIGURE 1.

FIGURE 2.

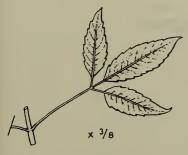


FIGURE 3.

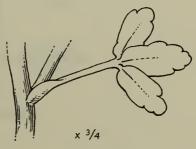


FIGURE 4.

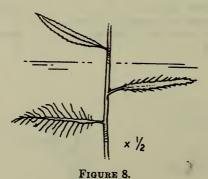
divided (fig. 7).

8. Leaves with terminal leaflet lan	gest 9.
8. Leaflets all near the same size_	10.
9. Flowers yellow (fig. 5)	
9. Flowers white (fig. 6)	Nasturtium, p. 119.
×I	x 3/4
FIGURE 5.	FIGURE 6.
10 Disease with simple at 11	
10. Plants with simple as well	as compound 11.
leaves.	
10. Plants with all leaves compoun	d 12.
11. Individual leaflets of compound leaves	also lobed or Neobeckia. p. 119.



11. Individual leaflets simple (fig. 8) Proserpinaca, p. 129.

FIGURE 7.



- 12. Base of petiole of leaf expanded into a sheath 13. which encircles stem at junction.
- 12. Base of petiole not expanded (fig. 8) ...... Proserpinaca, p. 129.
- 13. Leaves, at least the upper ones, only once compound Sium, p. 131. (fig. 9)
- 13. Leaves twice divided\_\_\_\_\_\_14
  - 14. Leaflets narrowly linear, untoothed; plants Ptilimnium, p. 131. annual (fig. 10).
  - Leaflets wider, toothed; plants perennial (fig. Cicuta, p. 131.
     11).

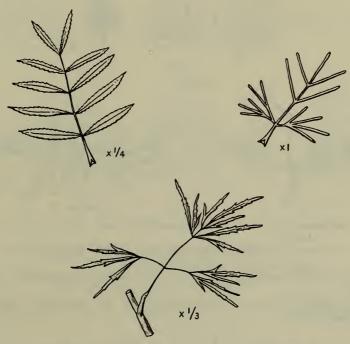


FIGURE 9.

FIGURE 11.

- axils of the leaves (fig. 13).

  17. Stem round, or nearly so, in cross-section; flowers Bidens, p. 140. showy, yellow (fig. 14).

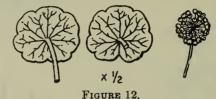


FIGURE 12.



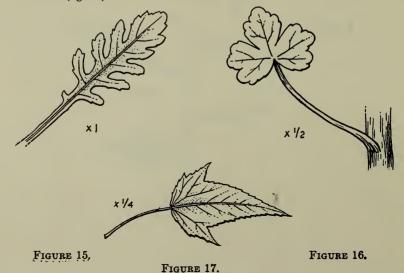
FIGURE 13.

 Leaves with veins radiating out from base 19. of leaf.

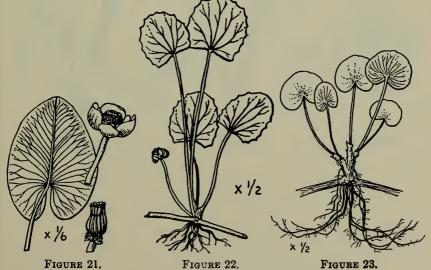
Leaves with central mid-vein and smaller Rorippa, p. 119.
 veins branching from this (fig. 15).

Base of petiole expanded; plants under 4 dm. tall (fig. Ranunculus, p. 118.
 16).

19. Base of petiole not expanded; plants large, 5 dm. tall Hibiscus, p. 122. or taller (fig. 17).



	2111120 01
20. Leaves all basal or arising from points along a horizontal stem.	; 21.
20. Leaves distributed along stem	_ 26.
21. Leaves coming off at points along a horizontal stem.	
21. Leaves basal to flower stalk	22.
22. Leaves with several prominent rib-like veins	
running from base to apex (fig. 18).	7 11115 maccac, p. 12.
22. Veins of leaves not prominent	23
23. Leaves with blunt lobes; flower conspicuous, purple	
not on a fleshy axis enclosed in a leaf-like sheath	
(fig. 19).	
23. Leaves usually with sharp lobes; flowers individually	Peltandra, p. 103.
inconspicuous, on a fleshy axis enclosed in a leaf	- 1 citanura, p. 100.
like sheath (fig. 20).	
dike bileath (1g. 20).	
x 1/4 × 1/6	
Figure 18. Figure 19.	FIGURE 20.
24. Leaves small (less than 0.5 dm. long), coming	25.
off from slender, prostrate stems.	
24. Leaves large (2 dm. long or more), coming	Nuphar, p. 116.
off of stout underground stems (fig. 21).	
25. Leaves toothed; veins of leaf irregular (fig. 22)	Centella, p. 131.
25. Leaves entire; veins of leaf nearly parallel (fig. 23)	. Heteranthera, p. 106.
TO AVA	



- 26. Leaves toothed
   27.

   26. Leaves not toothed (entire)
   28.
- 27. Plant small, less than 4 dm. tall; flowers yellow (fig. 24). Caltha, p. 118.
- 27. Plant large, over 5 dm. tall; flowers large, white, Hibiscus, p. 122. pink, or purplish (fig. 25).

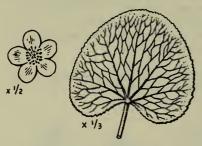
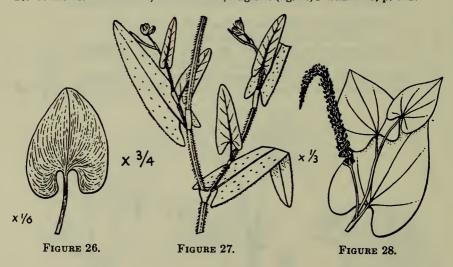




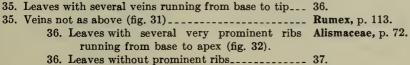


FIGURE 25.

- 28. Leaves mostly basal, heart-shaped; flowers Pontederia, p. 107. purple (fig. 26).
- Leaves well distributed along stem; flowers 29. not purple.
- 29. Sheaths (ocreae) around stem above each point of Polygonum, p. 114. leaf-attachment; flowers white to red, not fragrant (fig. 27).
- 29. Stems with no sheaths; flowers white, fragrant (fig. 28) \_ Saururus, p. 112.



	11 (1012) 11112 120 114011-10 121		,
	30. Leaves all from one point, or mostly all basal,	33.	
	or from points along a horizontal stem.	0.1	
	30. Leaves distributed along the upright stem		
	Leaves opposite		
31.	Leaves alternate or irregularly borne		
	32. Leaves entire or nearly so		
	32. Leaves prominently toothed		
	Leaves from points along a horizontal stem, peltate		
33.	Leaves mostly basal, not peltate		
	34. Leaves large, 2 dm. or more in diameter,	Nelumbo, p. 117.	
	impossible to wet; flowers solitary, showy,		
	yellow (fig. 29).	77 1 11 10	
	34. Leaves small, only a few cm. across; flowers	Hydrocotyle, p. 130	J.
	small, white, and in close clusters (fig. 30).		
	X 1/8  FIGURE 29  FIGURE 29		
	FIGURE 29. FIGURE	RE 3U.	
~ "			



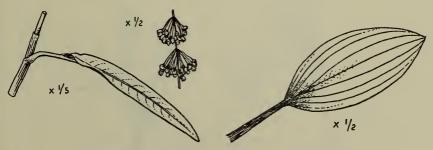


FIGURE 31.

FIGURE 32.

37. Plants white-powdery above; plants extremely large, Thalia, p. 111. usually over 1 m. (fig. 33).

37. Plants smaller; not white-powdery above\_\_\_\_\_

38. Petiole often very short; leaves shed water Orontium, p. 102. easily; flowers along fleshy spike enclosed in a leafy sheath (fig. 34).

38. Petioles long; flowers and leaves not as above\_ 39.







38.

FIGURE 34.

Flowers many; leaves large, over 10 cm. long (fig. 35) Pontederia, p. 107.
 Flowers solitary; leaves small, less than 5 cm. long Heteranthera, p. 106. (fig. 36).



FIGURE 35.



FIGURE 36.

40. Leaves entire or nearly so	65.
40. Leaves prominently toothed	77.
Leaf, when examined against light with lens, show-	Hypericum, p. 123.
ing semitransparent dots; flowers yellow or pink	
(fig. 37).	
Leaves not showing semitransparent dots	42.
42. Leaves broadened at base	43.
42. Leaves narrowed to base	46.
Leaves mostly under 2.5 cm. long	44.
Leaves mostly over 2.5 cm. long	45.
44. Plant aromatic when crushed (fig. 38)	Hydrotrida, p. 135.
44. Plant not aromatic when crushed (fig. 39)	
	40. Leaves prominently toothed  Leaf, when examined against light with lens, showing semitransparent dots; flowers yellow or pink (fig. 37).  Leaves not showing semitransparent dots

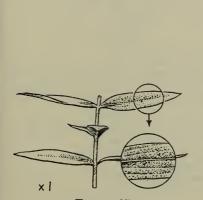


FIGURE 37.



FIGURE 38.

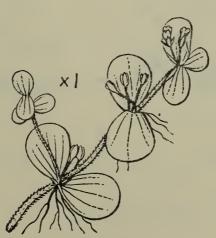


FIGURE 39.

- 45. Flowers showy, in clusters, yellow or pink (fig. 37)\_\_\_ Hypericum, p. 123.
- 45. Flowers not showy, in axils of leaves, mostly purple Ammannia, p. 125. (fig. 40).
  - 46. Leaves coverd with tiny black dots visible Gratiola, p. 135. with lens; flowers small, white (fig. 41).
  - Leaves not covered with black dots; flowers 47.
     various.

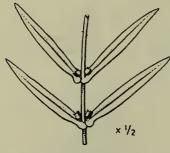


FIGURE 40.

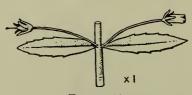


FIGURE 41.

- 47. Flowers conspicuous, at least 1 cm. long or across\_\_\_\_ 48.
- 47. Flowers inconspicuous, small, less than 1 cm. long or 53. across.
  - 48. Flowers irregular, purplish (fig. 42)\_\_\_\_\_ Justicia, p. 136.
  - 48. Flowers regular\_\_\_\_\_ 49.
- 49. Flowers yellow (fig. 37) Hypericum, p. 123.
- 49. Flowers not yellow 50.
  - 50. Stem woody at least at base, arching; flowers Decodon, p. 125. purple-pink, in auxiliary clusters (fig. 43).
  - Stems not woody and arching, but sometimes 51.
     corky at base.

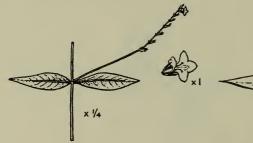


FIGURE 42.

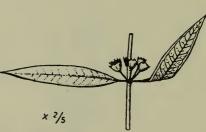


FIGURE 43.

- 51. Flowers purple; plant usually corky at base (fig. 44)\_\_ Lythrum, p. 126.
- 51. Flowers white or pink; plant usually not corky at base\_ 52.

  - 52. Flowers white, or, if pink, with a yellow or Sabatia, p. 133. green eye in center (fig. 45).



FIGURE 44.



FIGURE 45.

- 53. Flowers solitary in the leaf axils\_\_\_\_\_ 54.
- 53. Flowers in terminal clusters (fig. 46) \_\_\_\_\_ Cynoctonum, p. 133. 54. Flowers with small appendages between the Rotala, p. 125. sepals (fig. 47).
  - 54. Flowers without small appendages between Didiplis, p. 125. the sepals (fig. 48).



FIGURE 46.

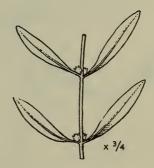


FIGURE 47.

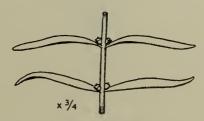


FIGURE 48.

<b>55.</b>	Leaves with three prominent ribs	62.
55.	Leaves without three prominent ribs	56.
	56. Stems square or 4-angled	57.
	56. Stems round in cross-section	60.
<b>57</b> .	Leaves petioled	58.
57.	Leaves sessile	59.
	58. Calyx of flower bearing a crest above (fig. 49)_	Scutellaria, p. 135.
	58. Calyx bearing no crest (fig. 50)	Mimulus, p. 136.



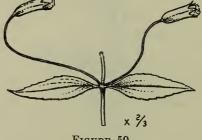


FIGURE 49.

FIGURE 50.

- 59. Flowers small, white, gathered in dense, sessile clusters Lycopus, p. 135. in the axils of the leaves (fig. 51).
- 59. Flowers solitary in the axils of the leaves (fig. 50)\_\_\_\_ Mimulus, p. 136. 60. Leaves small, mostly under 3 cm. long; Gratiola, p. 135. usually with black dots visible with a lens

covering them (fig. 52).

60. Leaves large, mostly over 5 cm. long and not 61. covered with black dots.

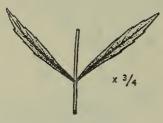


FIGURE 51.

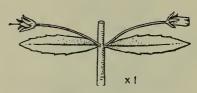


FIGURE 52.

- 61. Plants decumbent at base and usually rooting at the Lippia, p. 134. lower nodes (fig. 53).
- 61. Plants entirely erect\_\_\_\_\_63.
  - 62. Leaves long petioled; flowers inconspicuous Boehmeria, p. 113. (fig. 54).
  - 62. Leaves sessile or very short petioled; flowers Rhexia, p. 124. showy (fig. 55).



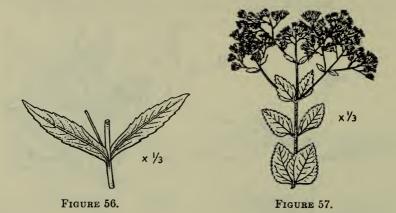
FIGURE 53.



FIGURE 54.



FIGURE 55.



- 65. Leaves with several veins running from base to apex\_\_ 66. 65. Leaves with branched veins\_\_\_\_\_ 67.
  - 66. Leaves large, mostly over 6 cm. wide; flowers Canna, p. 111. yellow, very large (fig. 58).
  - 66. Leaves smaller; flowers individually small, in Habenaria, p. 112. terminal spike-like clusters (fig. 59).



FIGURE 58.



FIGURE 59.

- 67. Stems with sheaths (ocreae) just above attachment 68. point of leaves.
- 67. Stems without sheaths 69.
  - 68. Plant with broad leaves, many basal; flowers Rumex, p. 113. stalked and drooping (fig. 60).
  - .68. Plant with narrower leaves, none basal; flow-Polygonum, p. 114. ers sessile, in terminal spikes (fig. 61).

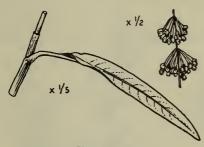


FIGURE 60.



FIUGRE 61.

- 69. Leaves not over twice as long as broad (fig. 62) Samolus, p. 132. 69. Leaves much longer than broad 70.
  - 70. Large herb with a very stout stem, often from Acnida, p. 115. 1 to 3 dm. in diameter at base, over 1.5 m. tall (fig. 63).
  - Smaller herbs; base of stem sometimes corky 71.
     but not extremely thick.



FIGURE 62.



FIGURE 63.

- 71. Flowers blue, violet, or purple\_\_\_\_\_ 72.
- 71. Flowers various but not blue or violet; petals some-74. times wanting.
  - 72. Sepals united at base into a tube enclosing the ovary and later the fruit; leaves without spines in axils.
  - 72. Sepals free to base and not including the Hydrolea, p. 134. ovary; leaves, or some of them, often with spines in axils (fig. 64).

73. Sepals longer than the calyx tube, reflexed (fig. 65) \_\_\_ Campanula, p. 138.

73. Sepals much shorter than the calyx tube, not reflexed Lythrum, p. 126. (fig. 44).







FIGURE 64.

FIGURE 65.

- 74. Flowers regular; petals, if present, yellow\_\_\_\_ 75.
- 74. Flowers irregular; white, orange, or yellow 76. in color.
- 75. Capsule or calyx tube short and stout, less than 1.5 cm. Ludwigia, p. 126. long; stamens 4 (fig. 66).
- 75. Capsule or calyx tube long and slender, over 1.5 cm. Jussiaea, p. 128. long; stamens 8 (fig. 67).







FIGURE 67.

- 76. Flowers in terminal clusters which may be Polygala, p. 120. compound (fig. 68).
- 76. Flowers solitary or a few in the axils of the Hygrophila, p. 136. leaves (fig. 69).

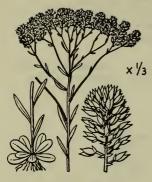


FIGURE 68.



FIGURE 69.

77. Leaves aromatic when crushed (fig. 70)	Pluchea, p. 139.
77. Leaves not aromatic	78.
78. Leaves large, over 5 cm. broad; flowers l	large, Hibiscus, p. 122.
over 5 cm. across (fig. 71).	
78. Leaves and flowers much smaller	79.

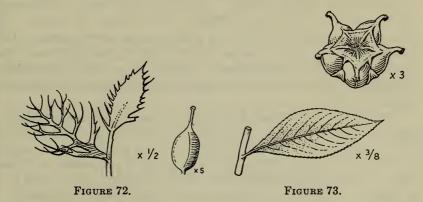


FIGURE 70.

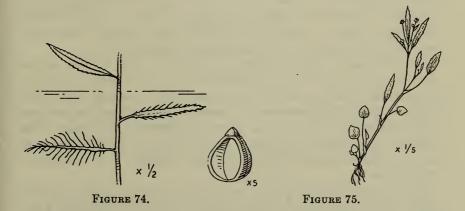


FIGURE 71.

- 79. Flowers not in terminal clusters, but more or less dis-81. tributed over plant.
- 79. Flowers in terminal clusters 80.
  - Flowers conspicuous, white, 4-petaled; fruit as Neobeckia, p. 119. in figure (fig. 72).
  - 80. Flowers greenish, 5-petaled; fruit as in figure Penthorum, p. 119. (fig. 73).



- 81. Flowers sessile, in the axils of the leaves; fruit a single Proserpinaca, p. 129. 3-angled nutlet (fig. 74).
- 81. Flowers stalked; fruit a group of several, scarcely Ranunculus, p. 118. angled, small nutlets (fig. 75).



## INTRODUCTION TO THE CATALOG

On the following pages is a list of the families, genera, and species of Southeastern aquatic plants. These follow the order of Robinson and Fernald's seventh edition of Gray's New Manual of Botany. If more than one species of a genus is present in the region, a key to the species follows the generic name. In the case of the Gramineae, the Cyperaceae, and the Alismaceae, illustrated keys within the family are included, as these groups are in most cases not carried to the genus in the main key.

The species list is annotated as to the range and habitat of the plants. Range is given not only as to political units but also is stated in terms of the physiographic regions involved. These physiographic regions are delimited on the frontispiece map and a few remarks on them follow. For economy of space statements of range, habitat, and frequency are usually given in phrases rather than complete sentences.

The Coastal Plain, which is a region made up of recent sediments lying adjacent to and extending back from our coasts, is the most important from a malariological point of view. The length of this guide is due in part to its rich aquatic flora, which is often quite different from that of the more northern regions such as are so well treated by Fassett in A Manual of Aquatic Plants. The subdivided Mississippi Valley is geologically similar to the Coastal Plain but is here differentiated because it has a distinctive flora.

The Piedmont, which consists of crystalline rocks or soils derived therefrom, has few extensive aquatic areas and is thus of less importance from the point of view of mosquito breeding. The Blue Ridge is also of little interest, and aquatic plants found in our territory only in the mountains are not considered in this guide. The paleozoic Appalachian Provinces and the Interior Low Plateaus do have a problem, along their larger rivers, especially in the vicinity of impoundments.

Also annotated are synonyms when nomenclature in this treatment differs from that offered by Small, Manual of the Southeastern Flora. A few notes on the association of mosquitoes with specific plants are given, but sufficient knowledge is lacking to make extensive generalizations.

A recently introduced species, the water-chestnut (*Trapa natans* L.), has not been recorded from our territory but occurs nearby in the Potomac River, where it has been found harboring *Anopheles quadrimaculatus*. It is not listed in this catalog.

## CATALOG OF AQUATIC PLANTS

### THALLOPHYTA

## CHARACEAE Muskgrass family

#### 1. Chara L.

Chara spp.—No attempt will be made to differentiate here the species of Chara, nor will it be attempted to distinguish Chara from the related Nitella (not listed). This list was designed to include primarily the vascular aquatic plants, and Chara is included because it has characters which make it simulate vascular species and because Anopheles quadrimaculatus is sometimes found associated with it.

### **BRYOPHYTA**

## RICCIACEAE Thallose liverworts

#### 1. Riccia L.

R. fluitans L.—Ponds, swamps, and springs over all our territory.

## 2. Ricciocarpus Corda

R. natans (L.) Corda—Common in ponds and swamps over most of our territory.

### PTERIDOPHYTA

# OSMUNDACEAE Flowering fern family

### 1. Ośmunda L.

O. regalis L. var. spectabilis (Willd.) A. Gray. Royal-fern—When aquatic mostly in alluvial swamps, not commonly encountered, range includes all of our territory.

# POLYPODIACEAE Fern family

#### 1. Anchistea Presl

A. virginica (L.) Presl. Virginia Chain-fern—Ranges over all of our Coastal Plain, most often found in very acid swamps or ponds.

# SALVINIACEAE Salvinia family

#### 1. Azolla Lam.

A. caroliniana Willd. Mosquito Fern—Assumes a red color when growing in the sun. Common in ponds, lakes and alluvial swamps over most of our area.

# ISOETACEAE Quillwort family

### 1. Isoetes L.

I. flaccida Shuttlw. Quillwort—Limesink ponds and other situations, Coastal Plain, South Georgia, and Florida. There are two varieties distinguishable in fruiting condition. There are several additional species of this genus in our territory, but only the above is likely to be encountered in mosquito work.

## **GYMNOSPERMAE**

# PINACEAE Pine family

## 1. Pinus [Tourn.] L.

P. serotina Michx. Pond-pine—Acid ponds and swamps, Coastal Plain, Florida north to beyond the limits of our territory and west at least to Alabama.

### 2. Taxodium L. C. Rich.

T. distichum (L). L. C. Rich. Cypress—This species, with two-ranked spreading needles, has a well-marked Coastal Plain variety with appressed needles (variety imbricarium (Nutt.) Sudw.) The variety with appressed needles is particularly characteristic of acid ponds in the Coastal Plain, while the typical plant is found over all our area (except the Piedmont and mountains) and reaches its best development in river swamps.

### ANGIOSPERMAE

# TYPHACEAE Cattail family

## 1. Typha [Tourn.] L.

- Leaves flat; inflorescence with staminate and dark 1. T. latifolia. brown pistillate portions separated; pollen of simple grains.
- 1. Leaves rounded on back; inflorescence with staminate 2. T. angustifolia. and light brown pistillate portions usually contiguous; pollen grains grouped in 4's.
- 1. T. latifolia L. Broad-leafed Cattail—Common over all our territory. Anopheles quadrimaculatus often found associated.
- 2. T. angustifolia L. Narrow-leafed Cattail—Characteristic of aquatic situations along the coast, very local inland, much less common than the preceding.

# SPARGANIACEAE Bur-reed family

## 1. Sparganium [Tourn.] L.

- 1. Achene fusiform, the body stalked; stigma 1........... 1. S. americanum.
- 1. Achene obpyramidal, cut nearly square across top; 2. S. eurycarpum. stigmas 2

- 1. S. eurycarpum Engelm. Bur-reed—Not common in the southeast, but noted north of our territory in association with Anopheles quadrimaculatus.
- 2. S. americanum Nutt. Bur-reed—Not collected by the writers but supposed to occur over most of our territory.

# NAJADACEAE Pondweed Family

## 1. Potamogeton [Tourn.] L.

1.	Plants with both floating and submerged leaves, the	2.
	floating leaves with expanded blades and differing	
	from submerged ones.	10
1.	Plants with all leaves alike and submerged	
	2. Submerged leaves filiform or very narrowly linear, less than 2 mm. wide.	3.
	2. Submerged leaves lanceolate or ovate or if	5.
	linear more than 2 mm. wide.	ο.
2	Flowers in cylindrical, many-flowered spikes only	1. P. natans.
	Flowers in globular, few-flowered spikes only  Flowers in globular, few-flowered spikes in the axils of	4.
o.	the submerged leaves as well as in cylindrical,	<b>1.</b>
	many-flowered emersed spikes.	
	4. Submerged leaves 0.5–2 mm. wide, not taper-	2. P. diversifolius.
	ing to a long point; floating leaves, when	2. 1 . 4100/31/01/46.
	present, rounded at the tip, the larger 5-15	
	nerved.	
	4. Submerged leaves 0.1-0.6 mm. wide, taper-	3. P. capillaceus.
	ing to a long point; floating leaves, when	
	present pointed at the tip, 3-7 nerved	
5.	Submerged leaves linear and ribbon-like	4. P. epihydrus.
5.	Submerged leaves lanceolate or ovate	6.
	6. Floating leaves heart-shaped at base	5. P. pulcher.
	6. Floating leaves rounded or tapering at base.	
7.	Floating leaves with 30-50 nerves	6. P. amplifolius.
7.	Floating leaves with less than 30 nerves	
	8. Upper submerged leaves with long petioles	
	8. Upper submerged leaves with obscure short	9.
	petioles or sessile.	
9.	Submerged leaves with an abrupt awl-shaped tip, 2–4	8. P. angustifolius
_	mm. long.	0 D :
9.	Submerged leaves with no awl-shaped tip.	
	10. Leaves lanceolate or broader, with curved	11.
	not parallel sides.  10. Leaves thread-like or ribbon-like, linear	15.
	with parallel sides.	10.
11	Leaves short petioled or sessile but not clasping at	12.
11.	base.	12.
11.	Leaves clasping at base	14.
	12. Leaves with an awl-shaped tip 2-4 mm. long	
	12. Leaves without awl-shaped tip	
13.	Fruit with a single keel	
	Fruit with 3 distinct keels	

- 14. Leaves undulate or crisped with 3-7 promi- 11. P. perfoliatus. nent nerves. 14. Leaves flat and with 1 prominent nerve\_\_\_\_ 12. P. bupleuroides. 15. Leaves ribbon-like, more than 2 mm. wide \_\_\_\_\_ 4. P. epihydrus. 15. Leaves narrower, usually filiform\_\_\_\_\_\_ 16. 16. Stipules united to base of leaf forming a 13. P. pectinatus sheath more than 1 cm. long; fruits on spike interrupted appearing like beads on a string. 16. Stipules not united to leaves or if united 17. forming a sheath much less than 1 cin.; fruits continuous on spike. 17. Plants with axillary globular spikes as well as cylindric 18. terminal spikes; fruit flat and spiralled like a snail shell. 17. Plants with terminal cylindric spikes only; fruit plump. 19. 18. Submerged leaves 0.5-2 mm. wide, not taper-2. P. diversifolius. ing to a long point; floating leaves, when present, rounded at the tip, the larger 5-15
  - 18. Submerged leaves 0.1-0.6 mm. wide, tapering 3. P. capilloceus. to a long point; floating leaves, when present, pointed at the tip, 3-7 nerved.

nerved.

- 1. P. natans L.—Found in various provinces but known only from northern part of our territory in Tennessee.
- 2. P. diversifolius Raf. Pondweed.—One of our more common Pondweeds, found in various provinces over most of our territory, although no positive record from Florida. Anopheles quadrimaculatus sometimes found associated.
- 3. P. capillaceus Poir.—Very similar to preceding but more characteristically Coastal Plain in distribution, found in all of our States except Tennessee. In Tennessee there are a few stations for the very similar P. bicupulatus Fernald which may be distinguished by its light brownish fruits with a coarsely toothed keel from P. capillaceus with its greenish fruit with an entire or finely toothed keel. P. capillaceus is often found in rather acid waters.
- 4. P. epihydrus Raf.—Known in our territory only from highland areas in Georgia, North Carolina, and Tennessee.
- 5. P. pulcher Tuckerm.—Found in ponds in various provinces, range includes all of our territory, not frequent.
- 6. P. amplifolius Tuckerm.—Range similar to preceding, found mostly in hard waters.
- 7. P. nodosus Poir.—One of the more common Pondweeds, found in various provinces, range includes all of our territory, commonly referred to as Potamogeton americanus C. & S.

- 8. P. angustifolius Berchtold & Presl—Range same as two preceding, but infrequent.
- 9. P. gramineus L.—The range of this very variable species covers all of our territory.
  - 10. P. illinoensis Morong—Should occur over all of our range.
- 11. P. perfoliatus L.—Slow streams and ponds, various provinces, over all of our territory.
- 12. P. bupleuroides Fernald—Found mostly in brackish waters, range extends south to Florida.
- 13. P. pectinatus L.—Characteristic of hard water streams or lakes, range includes all of our territory.
- 14. P. foliosus Raf.—Known from our area only in Georgia and Tennessee except for isolated stations in the Coastal Plain of South Carolina and Florida.
- 15. P. berchtoldi Fieber—Very variable species, known only from one or two isolated stations in our territory, probably occurs more widely unrecognized. Cited as P. pusillus L. by Small.

## 2. Zannichellia [Mich.] L.

Zannichellia palustris L. Horned Pondweed—Hard waters and brackish as well as fresh situations, infrequent, should range over most of our area.

## 3. Najas L.

- 1. Seed dull, coarsely pitted; style 0.5 mm. long or less\_\_\_\_ 2. N. guadalupensis.
- 1. N. flexilis (Willd.) R. & S.—Species of Najas observed by the senior author in the southeast have not been separated, but this is likely the most common species.
- 2. N. guadalupensis (Spreng.) Morong—Supposed to be rare and local. In addition another species, N. gracilis (Morong) Small, listed by Small from fresh water situations in Florida, is probably more properly N. marina L. var. gracilis Morong.

## 4. Ruppia L.

R. maritima L. Widgeon-grass—Rarely occurs inland, primarily a brackish water species, noted in artesian ponds along the coast in Georgia.

# ALISMACEAE Water plantain family

- 1. Fruits borne in a ring; stamens 6; inflorescences much 1. Alisma, p. 72. branched (fig. 1).
- Fruits in dense heads; stamens usually more than 6;
   inflor scences not greatly branched.
  - 2. Lowest flowers with only carpels, or with only 2. Sagittaria, p. 72. stamens (fig. 2).
  - 2. Lowest flowers with both stamens and carpels \_\_\_ 3.



FIGURE 1.

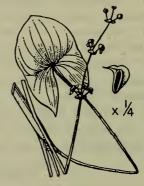


FIGURE 2.

- - x /h

FIGURE 3.



FIGURE 4.

### 1. Alisma L.

A. subcordatum Raf.—Should occur over most of our territory but noted only a few times. Seems to prefer alluvial situations.

## 2. Sagittaria L.

- 1. Sepals appressed to the fruit head\_\_\_\_\_\_ 1. S. montevidensis.
- Sepals lax or reflexed but not appressed to the fruit 2. head.
  - 2. Fruit-bearing pedicels reflexed or recurved\_\_\_ 3.
  - 2. Fruit-bearing pedicels ascending..... 5.

	Till ( 1-1	
	Filaments glabrous	
3.	Filaments pubescent	2. S. platyphylla.
	4. Inflorescence not branched; leaves not atten-	3. S. subulata.
	uate.	4 07 0314
_	4. Inflorescence branched; leaves attenuate	
	Leaves without basal lobes	
5.	Leaves, at least some of them, with basal lobes	
	6. Pedicels of pistillate flowers as long (or nearly	7.
	so) as staminate.	
	6. Pedicels of pistillate flowers very short or	15.
_	nearly wanting.	
	Filaments not dilated, slender	
7.	Filaments dilated, relatively short	
	8. Bracts and sepals granular-papillose	
	8. Bracts and sepals ribbed	
9.	Achene gradually long-beaked; dorsal wing thick and	6. S. lancifolia.
	even.	- 0
9.	Achene abruptly minutely beaked, dorsal wing thick	7. S. angustifolia.
	and crested.	
	10. Leaf-blades 3-sided, often imperfectly devel-	11.
	oped.	
	10. Leaf-blades flat	
11.	Achene 2 mm. long with several facial wings; anthers	8. S. teres.
	longer than filaments.	0 0
11.	Achene 1 mm. long with 3 low facial ribs; anthers	9. S. isoetiformis.
	shorter than filaments.  12. Achene oval or broadly elliptic	
		10 0 7 1
10	12. Achene cuneate	13.
	12. Achene cuneateBeak large, horizontal, at top of achene body	13. 11. S. mohrii.
	12. Achene cuneate	13. 11. S. mohrii. 14.
	12. Achene cuneate	13. 11. S. mohrii. 14.
	12. Achene cuneate	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> </ol>
	12. Achene cuneate	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> </ol>
13.	12. Achene cuneate	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> <li>13. S. chapmanii.</li> </ol>
13.	12. Achene cuneate	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> </ol>
<ul><li>13.</li><li>15.</li></ul>	12. Achene cuneate	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> <li>13. S. chapmanii.</li> <li>14. S. macrocarpa.</li> </ol>
<ul><li>13.</li><li>15.</li></ul>	12. Achene cuneate	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> <li>13. S. chapmanii.</li> </ol>
<ul><li>13.</li><li>15.</li></ul>	12. Achene cuneate	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> <li>13. S. chapmanii.</li> <li>14. S. macrocarpa.</li> <li>15. S. rigida.</li> </ol>
<ul><li>13.</li><li>15.</li></ul>	12. Achene cuneate  Beak large, horizontal, at top of achene body  14. Inflorescence simple; achene with lateral wings or ribs.  14. Inflorescence compound; achene without lateral ribs or wings.  Fruit head not echinate; achene widely-winged and short-beaked.  Fruit head echinate; achene narrowly-winged and long-beaked.  16. Achene minutely beaked	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> <li>13. S. chapmanii.</li> <li>14. S. macrocarpa.</li> <li>15. S. rigida.</li> <li>12. S. graminea.</li> </ol>
<ul><li>13.</li><li>15.</li><li>15.</li></ul>	12. Achene cuneate	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> <li>13. S. chapmanii.</li> <li>14. S. macrocarpa.</li> <li>15. S. rigida.</li> <li>12. S. graminea.</li> <li>17.</li> </ol>
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<ul><li>13.</li><li>15.</li><li>15.</li></ul>	12. Achene cuneate  Beak large, horizontal, at top of achene body  14. Inflorescence simple; achene with lateral wings or ribs.  14. Inflorescence compound; achene without lateral ribs or wings.  Fruit head not echinate; achene widely-winged and short-beaked.  Fruit head echinate; achene narrowly-winged and long-beaked.  16. Achene minutely beaked  16. Achene prominently beaked  Beak of achene horizontal or nearly so  Beak of achene erect	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> <li>13. S. chapmanii.</li> <li>14. S. macrocarpa.</li> <li>15. S. rigida.</li> <li>12. S. graminea.</li> <li>17.</li> <li>16. S. latifolia.</li> <li>18.</li> </ol>
<ul><li>13.</li><li>15.</li><li>15.</li></ul>	12. Achene cuneate	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> <li>13. S. chapmanii.</li> <li>14. S. macrocarpa.</li> <li>15. S. rigida.</li> <li>12. S. graminea.</li> <li>17.</li> <li>16. S. latifolia.</li> <li>18.</li> <li>19.</li> </ol>
13. 15. 15.	12. Achene cuneate  Beak large, horizontal, at top of achene body  14. Inflorescence simple; achene with lateral wings or ribs.  14. Inflorescence compound; achene without lateral ribs or wings.  Fruit head not echinate; achene widely-winged and short-beaked.  Fruit head echinate; achene narrowly-winged and long-beaked.  16. Achene minutely beaked  16. Achene horizontal or nearly so  Beak of achene erect  18. Filaments pubescent  18. Filaments glabrous	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> <li>13. S. chapmanii.</li> <li>14. S. macrocarpa.</li> <li>15. S. rigida.</li> <li>12. S. graminea.</li> <li>17.</li> <li>16. S. latifolia.</li> <li>18.</li> <li>19.</li> <li>17. S. longirostra.</li> </ol>
13. 15. 15.	12. Achene cuneate  Beak large, horizontal, at top of achene body  14. Inflorescence simple; achene with lateral wings or ribs.  14. Inflorescence compound; achene without lateral ribs or wings.  Fruit head not echinate; achene widely-winged and short-beaked.  Fruit head echinate; achene narrowly-winged and long-beaked.  16. Achene minutely beaked  16. Achene prominently beaked  Beak of achene horizontal or nearly so  Beak of achene erect  18. Filaments pubescent  18. Filaments glabrous  Pistillate pedicels very short; sepals and bracts glab-	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> <li>13. S. chapmanii.</li> <li>14. S. macrocarpa.</li> <li>15. S. rigida.</li> <li>12. S. graminea.</li> <li>17.</li> <li>16. S. latifolia.</li> <li>18.</li> <li>19.</li> <li>17. S. longirostra.</li> </ol>
13. 15. 17. 17.	12. Achene cuneate  Beak large, horizontal, at top of achene body  14. Inflorescence simple; achene with lateral wings or ribs.  14. Inflorescence compound; achene without lateral ribs or wings.  Fruit head not echinate; achene widely-winged and short-beaked.  Fruit head echinate; achene narrowly-winged and long-beaked.  16. Achene minutely beaked  16. Achene prominently beaked  Beak of achene horizontal or nearly so  Beak of achene erect  18. Filaments pubescent  18. Filaments glabrous  Pistillate pedicels very short; sepals and bracts glabrous.	<ol> <li>13.</li> <li>11. S. mohrii.</li> <li>14.</li> <li>12. S. graminea.</li> <li>13. S. chapmanii.</li> <li>14. S. macrocarpa.</li> <li>15. S. rigida.</li> <li>12. S. graminea.</li> <li>17.</li> <li>16. S. latifolia.</li> <li>18.</li> <li>19.</li> <li>17. S. longirostra.</li> <li>15. S. rigida.</li> </ol>
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1. S. montevidensis C. &. S. Giant Arrow-leaf—Noted by the senior author only in ditches, marshes, and ponds along the coast but probably occurs elsewhere. Is easily distinguished by its gigantic size—the leaves sometimes reach a half a meter in length.

- 2. S. platyphylla (Engelm.) J. G. Smith. Swamp-potato—Found only in the western part of our territory, most abundant along the lower Mississippi River.
- 3. S. subulata (L.) Buchenau—The representative of this species most likely to be found in southeastern fresh water habitats is var. natans J. G. Smith. Has not been collected by the writers.
- 4. S. filiformis J. G. Smith—Ponds in Alabama, Florida, and possibly the Carolinas. It has not been noted by the writers.
- 5. S. falcata Pursh—Similar to the following two species. Collected from ponds and marshes along the Georgia coast.
- 6. S. lancifolia L.—The giant Sagittaria of the Everglades, often grows higher than a man's head. Should be found only in the southern part of our territory.
- 7. S. angustifolia Lindl.—Georgia to Louisiana in swamps, not noted by the writers.
- 8. S. teres S. Wats.—This small Sagittaria with imperfectly developed leaves has been collected by the senior author from the edges of open, acid limesinks in southwest Georgia. Its published range is South Carolina to Massachusetts.
- 9. S. isoetiformis J. G. Smith—Said to occur in Georgia and Florida in the Coastal Plain.
- 10. S. cycloptera (J. G. Smith) C. Mohr—Swamps in the Coastal Plain, Florida to South Carolina and westward along the Gulf of Mexico to beyond the limits of our range.
- 11. S. mohrii J. G. Smith—Coastal Plain, Florida to Georgia and Mississippi in ponds.
- 12. S. graminea Michx.—This narrow-leafed Sagittaria should range over most of our territory. Has been noted often.
- 13. S. chapmanii (J. G. Smith) C. Mohr—Strictly Coastal Plain in distribution, Florida, Georgia, and Alabama.
  - 14. S. macrocarpa J. G. Smith-Ponds, South and North Carolina.
- 15. S. rigida Pursh—Well distributed species, probably not common in our territory, although said to occur south to Florida. Forma elliptica (Engelm.) Fernald has broad and sometimes lobed leaves.
- 16. S. latifolia Willd.—Most abundant and one of our most variable species, found in some form over all of our territory. Variety pubescens (Muhl.) J. G. Smith is hairy on the bracts, sepals, and inflorescence rachis and is primarily Coastal Plain in distribution. Variety obtusa (Muhl.) Weigand has the leaf tip blunt or rounded. Forma gracilis (Pursh) Robinson has very narrow leaf-lobes. Forma diversifolia (Engelm.) Robinson has lobeless as well as lobed leaves. Forma hastata (Pursh) Robinson has hastate rather than sagittate leaves. This species has been found in association with Anopheles quadrimaculatus.

- 17. S. longirostra (Micheli) J. G. Smith—Usually found in the Coastal Plain, noted in acid, open ponds in Georgia.
- 18. S. viscosa C. Mohr—Restricted to North Florida and South Alabama in marshes.

### 3. Echinodorus L. C. Rich.

- 1. Achene with little or no beak, stamens 9; plants small 1. E. tenellus. (usually less than 1.5 dm.), leaves narrow.
- Achene prominently beaked, stamens 12-21; plants 2. usually longer, leaves broadened,
  - 2. Flowering stems erect; stamens 12...... 2. E. cordifolia.
  - 2. Flowering stems arching or creeping, often root- 3. E. radicans. ing at nodes; stamens about 21.
- 1. E. tenellus (Martius) Buchenau—Should range over most of our territory, not noted by the writers. Called by Small Helanthium parvulum (Engelm.) Britton.
- 2. E. cordifolius (L.) Griseb. Burhead—Should also be well distributed over our area, not common.
- 3. E. radicans (Nutt.) Engelm. Burhead—Well distributed over our area, but infrequent. Prefers hard or neutral waters, noted principally in alluvial aquatic areas.

## 4. Lophotocarpus T. Durand

L. calycinus (Engelm.) J. G. Smith—Confined to western part of our territory. Noted along Mississippi River just north of our territory.

## HYDROCHARITACEAE Frog-bit family

### 1. Anacharis Planch

- 1. Leaves 3 in whorls; petals less than 5 mm. long or want- 1. A. canadensis. ing.
- 1. Leaves 4 in whorls; petals prominent, about 1 cm. long\_ 2. A. densa.
- 1. A. canadensis (Michx.) Planch. Waterweed—Occurs mostly north of our territory but present in Reelfoot Lake, Tennessee.
- 2. A. densa (Planch.) Victorin—Occurs as an escape from aquaria. Collected in Chatham County, Georgia, where it harbored Anopheles quadrimaculatus. Besides the above two, there is a third, very local species in middle Tennessee.

## 2. Vallisneria [Mich.] L.

V. americana Michx. Eelgrass—Some authorities differentiate two species of Vallisneria in the southeast, but these two are very similar. Except along the Gulf Coast, Eelgrass is very rare (or absent) in our territory.

### 3. Limnobium L. C. Rich.

L. spongia (Bosc) Steud. Frog-bit—Fairly common over most of our territory. It has been noted in very acid and in alkaline waters, thus showing considerable tolerance. It has been found in association with Anopheles and is mat-forming.

# GRAMINEAE Grass family

- 1. Plants floating, or forming mats at surface of water, 2. or creeping along ground.
- 1. Plants essentially erect\_\_\_\_\_\_ 3.
  - 2. Leaves floating flat on surface; inflorescences 7. Hydrochloa, p. 82. minute and inconspicuous (fig. 1).
  - Leaves not flat-floating; inflorescences large 9. Paspalum, p. 82. and conspicuous (fig. 2).



FIGURE 1.



FIGURE 2.

- 3. Plants with two kinds of spikelets; that is, pistils and stamens borne in different spikelets.
- 3. Plants with all spikelets alike; stamens and pistils in same spikelets.
  - 4. Inflorescences not expanded; the lower pistil- 16. Tripsacum, p. 84. late portion breaking up into bony, beadlike joints (fig. 3).

4. Inflorescence expanded\_\_\_\_\_

5. Pistillate spikelets borne above staminate in inflores- 4. Zizania, p. 81. cence; leaves not cutting (fig. 4).

5. Pistullate and staminate spikelets intermixed; leaves 6. Zizaniopsis, p. 82. with scabrous, cutting margins (fig. 5).



6. Plants woody, bamboo-like (fig. 6)	1. Arundinaria, p. 80.
6. Plants not woody	7.
7. Inflorescence made up of bony, bead-like joints	15. Manisuris, p. 84.
(fig. 7).	
7. Inflorescence not made up of bony, bead-like joints	8
8. Inflorescence feathery, long-hairy, or spiny	9.
8. Inflorescence smooth	11.
9. Inflorescence plume-like, feathery or at least spiny;	10.

not appearing branched.

9. Inflorescence not plume-like nor feathery; panicle 12. Echinochloa, p. 83. obviously branched (fig. 8).



FIGURE 6.



FIGURE 7.



FIGURE 8.

- Spikelets spineless (awnless) but subtended by several bristles; panicle often nodding (fig. 9).
- Spikelets long-spiny (long-awned), with or without hairs at base; panicle not nodding (fig. 10).
- 13. Setaria, p. 84.
- 14. Erianthus, p. 84.



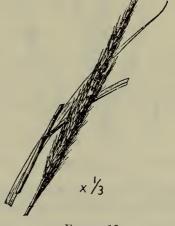


FIGURE 9.

FIGURE 10.

- 11. Spikelets appressed along one side of rachis, forming 12. 1 to many compact 1-sided spikes or spike-like racemes.
- 11. Spikelets not appressed along one side of rachis\_\_\_\_\_ 14.
  - 12. Spikelets 6 mm. long or more; grass grow- 3. Spartina, p. 81. ing in huge clumps (fig. 11).
  - 12. Spikelets 5 mm. long or less\_\_\_\_\_ 13
- 13. Spikelets arranged along rachis with back of fruit 8. Axonopus, p. 82. away from rachis; rachis 3-sided (fig. 12).
- Spikelets arranged along rachis with back of fruit 9. Paspalum, p. 82. toward rachis; rachis often winged or foliaceous (fig. 2).

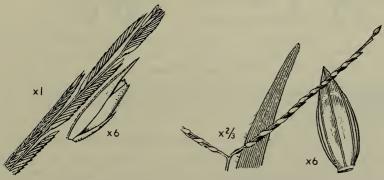


FIGURE 11.

FIGURE 12.

14. Spikelets with several florets (fig. 13)	2. Glyceria, p. 81.
14. Spikelets 1-flowered	15.
15. Spikelets very strongly flattened (fig. 14)	4. Leersia, p. 81.
15. Spikelets not strongly flattened	16.

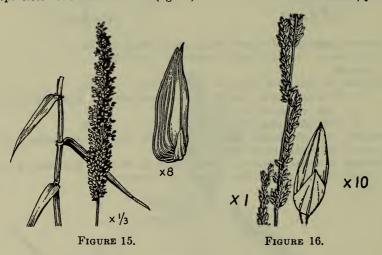


XI DO STORE

FIGURE 13.

FIGURE 14.

16. Spikelets inflated or gibbous at base (fig. 15) 11. Sacciolepis, p. 83.
16. Spikelets not inflated at base (fig. 16) 10. Panicum, p. 82.



### 1. Arundinaria Michx.

- 1. Panicles on leafy branches; stems often over 2 m. high. 1. A. gigantea.
- Panicles on naked shoots from rhizomes; stems usually 2. A. tecta. under 2 m. high.
- 1. A. gigantea (Walt.) Chapm. Giant Cane—Occurs in colonies or canebreaks, mostly along river lowlands. Flowers very infrequently and for that reason is sometimes difficult to distinguish from the following species. Both species occur over all of our area, but the

Giant Cane is evidently much less abundant. *Phragmites communis* Trin., another large bamboo-like species, is found locally in our territory, mostly in brackish situations. It may be distinguished by its wide, spreading leaves and its feathery inflorescence.

2. A. tecta (Walt.) Muhl. Small Cane—More characteristically Coastal Plain in distribution than the Giant Cane, very frequent in moist places of many kinds but rarely present in any depth of water.

## 2. Glyceria R. Brown

G. septentrionalis Hitchc.—Only representative of this primarily aquatic genus which must be considered in our territory, not common. It has been recorded from Alabama and South Carolina, and the senior writer collected it on one occasion from a limesink in Coastal Plain Georgia.

## 3. Spartina Schreb.

- 1. Spikes numerous, at least more than 10; inflorescence 1. S. spartinae. dense, cylindric.
- 1. Spikes fewer, not more than 10; inflorescence not dense\_ 2. S. bakeri.
- 1. S. spartinae (Trin.) Merr. Cordgrass—Several species of this genus occur in our territory but only this and the following species are characteristically found in fresh water. In our territory it has been collected near the coast in Florida and Mississippi where it occurs in marshes and swamps.
- 2. S. bakeri Merr. Cordgrass—Well distributed in Florida, found less commonly near the coast in Georgia and further north; occurs also in brackish water.

#### 4. Leersia Swartz

- 1. Spikelets broadly oval, 3 to 4 mm. wide\_\_\_\_\_\_ 1. L. lenticularis.
- 1. Spikelets narrower, elliptic\_\_\_\_\_\_2.
  - 2. Panicles narrow the branches ascending or ap- 2. L. hexandra. pressed.
  - 2. Panicles expanded, the branches spreading.... 3. L. oryzoides.
- 1. L. lenticularis Michx. Catchfly-grass—Ranges over all our area, found mostly along the larger rivers.
- 2. L. hexandra. Swartz. Cutgrass—Found by the writers mostly in acid situations, range includes all of our Coastal plain.
- 3. L. oryzoides (L.) Swartz. Rice Cutgrass—Most widespread and abundant Leersia in our territory, frequently found in limesink ponds in Georgia, may be found along rivers and probably elsewhere, range includes all of our territory.

#### 5. Zizania L.

Z. aquatica L. Wild rice—Not common in our territory, seen most frequently in fresh-water marshes near the coast, but has been recorded from every State in our range.

### 6. Zizaniopsis Doell and Aschers

Z. miliacea (Michx.) Doell and Aschers. Cutgrass—Often grows in the same situations as Zizania but usually more abundant. Marshes along the larger rivers seem to be favored by it, and in Reelfoot Lake, Tennessee, Anopheles quadrimaculatus has been found associated with it. Its range includes all of our Coastal Plain.

### 7. Hydrochloa Beauv.

H. caroliniensis Beauv.—Widespread in the Coastal Plain, Florida to North Carolina and Louisiana; occurs in acid to neutral water, showing considerable tolerance; has often been found harboring Anopheles quadrimaculatus.

## 8. Axonopus Beauv.

- 1. Spikelets 4 to 5 mm. long, glabrous\_\_\_\_\_\_1. A. furcatus.
- 1. Spikelets about 2 mm. long, sparsely appressed, silky\_\_\_ 2. A. affinis.
- 1. A. furcatus (Flügge) Hitchc.—Coastal Plain species, noted along acid lake margins in the Okefinokee Swamp, occurs in all of our States except Tennessee.
- 2. A. affinis Chase. Carpet-grass—Coastal Plain species, most often found in acid situations, well distributed over our area but seldom grows in over an inch or two of water. Often behaves like a weed.

## 9. Paspalum L.

- 1. Rachis of inflorescence foliaceous, broad\_\_\_\_\_\_ 2.
- - 2. Rachis extending beyond uppermost spikelets; 1. P. repens. racemes many, at least over 6.
  - 7. Rachis not extending beyond uppermost spike- 2. P. dissectum. let; racemes 2 to 4.
- 3. Racemes usually 2 (sometimes with a third) \_\_\_\_\_ 3. P. distichum
- 3. Racemes usually 4 to 6\_\_\_\_\_\_ 4. P. praecox.
- 1. P. repens Berg.—Floating or reclining plant, has been recorded from all the States in our territory except possibly North Carolina, not frequent.
- 2. P. dissectum L.—Well distributed in our area, infrequent, collected once from limesink in Georgia, habit similar to preceding.
- 3. P. distichum L.—Has been recorded from all of the States in our territory, most common near the coast.
- 4. P. praecox Walt.—Coastal Plain, sometimes in aquatic situations. In addition to the four species given above, there are several other species of Paspalum which sometimes occur in wet places, but since this is only an occasional habit for these species they are not included here.

#### 10. Panicum L.

- Spikelets short-pedicelled along one side of the rachis 2. forming spike-like racemes.
- Inflorescences open or sometimes contracted and with 3. one-sided racemes but not as above.

- 2. Glume almost as long as the lemma\_\_\_\_\_\_1. P. gymnocarpon.
- 2. Glume much shorter than lemma...... 2. P. hemitomum.
- 3. Plants with conspicuous creeping rhizomes\_\_\_\_\_ 3. P. virgatum.
- 3. Plants without creeping rhizomes\_\_\_\_\_\_4.
  - 4. Panicles narrow and few-flowered \_\_\_\_\_\_ 4. P. tenerum.
  - 4. Panicles more or less spreading..... 5.
- 5. Spikelets 1.8 to 2 mm. long; panicle branches ascend- 5. P. agrostoides. ing or spreading.
- Spikelets 2.5 mm. long; panicle branches erect or 6. P. condensum. nearly so.
- 1. P. gymnocarpon Ell.—Lower Gulf State species, Georgia and Florida westward, usually associated with rivers or streams.
- 2. P. hemitomum Schultes. Maidencane—Coastal Plain species, ranges over all of our Coastal Plain territory. Makes good growth in open, grassy limesinks and occurs also in the Okefinokee Swamp. It is perhaps the most important of the aquatic Panic-grasses.
- 3. P. virgatum L. Switchgrass—Aquatic and other situations mostly along the coast, but range includes most of our area.
- 4. P. tenerum Beyr.—Coastal Plain, North Carolina to Florida and Texas, seems to prefer acid situations.
- 5. P. agrostoides Spreng.—Well distributed over our area, in some places an important constituent of the aquatic flora, usually occupies a marginal position.
- 6. P. condensum Nash—Resembles the preceding, but of Coastal Plain distribution. In addition to the six given, there are several other Panic-grasses which sometimes appear to be aquatic, and there are in South Florida perhaps two truly aquatic species which are not listed.

#### 11. Sacciolepis Nash

S. striata (L.) Nash—Frequent in portions of our region, in Georgia seems to prefer acid situations, range includes all of our Coastal Plain.

### 12. Echinochloa Beauv.

- Lower leaf-sheaths smooth; awns various but panicles 1. E. crusgalli. not densely hairy.
- Lower leaf-sheaths hairy; panicles densely hairy from 2. E. walteri. long-awned spikelets.
- 1. E. crusgalli (L.) Beauv. Wild Millet—Widely distributed, often weedy, range includes all of our area, it and the following species common near the coast.
- 2. E. walteri (Pursh) Heller—In marshes along the coast, less commonly in aquatic areas near the larger rivers, range includes all of our territory.

### 13. Setaria Beauv.

S. magna Griseb. Giant Bristlegrass—Marshes near the coast over most of our territory.

### 14. Erianthus Michx.

- 1. Spikelets naked or nearly so at base\_\_\_\_\_\_ 1. E. strictus.
- 1. Spikelets with a conspicuous hair tuft at base\_\_\_\_\_\_ 2.
  - 2. Basal hairs sparse and shorter than spikelets \_\_\_\_ 2. E. brevibarbis.
  - 2. Basal hairs copious and longer than spikelet\_\_\_\_ 3. E. giganteus.
- 1. E. strictus Baldw. Narrow Plumegrass-Coastal Plain acid aquatic areas, over most of our area.
- 2. E. brevibarbis Michx. Brown Plumegrass—Distribution similar to the preceding.
- 3. E. giganteus (Walt.) Muhl. Giant Plumegrass-More truly aquatic than the preceding two, similarly distributed.

### 15. Manisuris L.

M. rugosa (Nutt.) Kuntze—In acid situations, range includes all of our Coastal Plain territory.

### 16. Tripsacum L.

T. dactyloides L. Gamagrass—Widely distributed in moist places: not common, range includes all of our territory.

# CYPERACEAE Sedge family

- 1. Flowers with both stamens and pistils\_\_\_\_\_\_ 2. 1. Stamens and pistils in different flowers\_\_\_\_\_
  - 2. Stem with one or more terminal spikelets; 3.
  - leaves absent.
  - 2. Stem with a leaf or leaves extending beyond spikelets (If a single leaf, this leaf may appear like continuation of scape).
- 3. Stem topped by a single spikelet; a leaf-sheath present 4. Eleocharis, p. 88. only at the base of the stem (fig. 1).
- 3. Stem topped by 1 to several spikelets; leaf-sheaths dis- 6. Fuirena, p. 93. tributed along the stem (fig. 2).

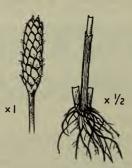


FIGURE 1



FIGURE 2

- 4. Spikelets subtended by conspicuous white or 7. Dichromena, p. 94. partly white bracts (fig. 3).
- 4. Spikelets not subtended by white bracts\_\_\_\_ 5.
- 5. Scales of the spikelet 2-ranked, often making the spike- 6. let appear flattened.
- 5. Scales of the spikelet spirally overlapping, not 2-ranked-
  - 6. Stem round, hollow; spikelets borne in axillary as well as terminal clusters (fig. 4).
  - 6. Stem 3-angled, sometimes bluntly so; spikelets 2. Cyperus, p. 87. borne in terminal clusters (fig. 5).

- 7.
  - 1. Dulichium, p. 87.

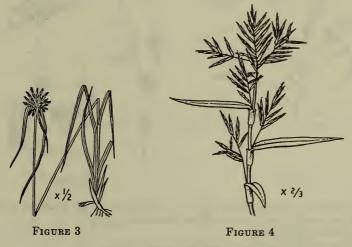




FIGURE 5

- 7. Achene bearing a tubercle (formed by the swollen per- 8. sistent style base).
- 7. Achene not bearing a tubercle-----
  - 8. Spikelets with more than 2 scales enclosing 8. Psilocarya, p. 94. achenes; no perianth-bristles present (fig. 6).
  - 8. Spikelets with only 1 or 2 scales enclosing 9. Rhynchospora, p. 94. achenes; perianth-bristles usually present (fig. 7).



FIGURE 6

FIGURE 7

10.

- 9. Spikelets with the uppermost scale only enclosing an 10. Cladium, p. 98. achene; our commonest species has saw-edged, cutting leaves (fig. 8).
- 9. Spikelets with the upper several scales bearing achenes; leaves not armed.
  - 10. Each scale of spikelet bearing a bristle or awn 6. Fuirena, p. 93. near the apex (fig. 9).
  - 10. Each scale of spikelet not bearing a bristle or 11.



FIGURE 8

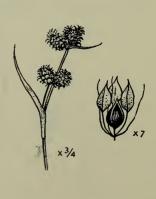


FIGURE 9

- 11. Style swollen at base but the swollen base not persist- 3. Fimbristylis, p. 88. ent on achene (fig. 10).
- 11. Style not swollen at base (fig. 11)\_\_\_\_\_\_ 5. Scirpus, p. 91.

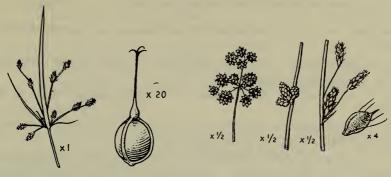
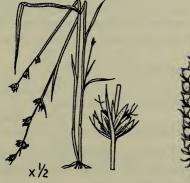


FIGURE 10

FIGURE 11

- 12. Achene exposed (fig. 12) \_\_\_\_\_\_ 11. Scleria, p. 98.
- 12. Achene enclosed in a sac (perigynium) (fig. 14) 12. Carex, p. 98.





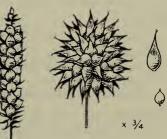


FIGURE 13.

#### 1. Dulichium L. C. Rich.

D. arundinaceum (L.) Britton—This species is distributed over most of our area, and seems to prefer acid situations, at least in the Coastal Plain.

## 2. Cyperus [Tourn.] L.

- 1. Achenes lenticular, 2-sided \_\_\_\_\_\_ 1. C. flavescens.
- 1. Achenes triangular in x-section, 3-sided \_\_\_\_\_ 2.
  - Plants perennial; bases hardened, corm-like, or 3. stoloniferous.
  - 2. Plants annual; bases not hardened or stolonif- 2. C. erythrorhizos.
- Scales of spikelets deciduous, falling away from the 4. rachilla of the spikelet.

- 3. Whole spikelet falling away from the main rachis..... 3. C. strigosus.
  - 4. Stems naked below; rachilla of spikelet winged\_ 4. C. haspan.
- 5. Achenes narrowly ellipsoid; scales of spikelet about 2.5 5. C. virens. mm. long.
- 5. Achenes linear; scales of spikelet about 2 mm. long\_\_\_\_ 6. C. pseudovegetus.
- 1. C. flavescens L.—Shallow water and muddy places over most of the Southeast, frequent.
- 2. C. erythrorhizos Muhl.—Also distributed over most of our territory.
- 3. C. strigosus L.—Common over all of the Southeast, sometimes in deeper water than the preceding.
- 4. C. haspan L.—Often truly aquatic, seems to prefer acid situations, Coastal Plain, Florida north and west to beyond the limits of our territory.
- 5. C. virens Michx.—Collected from aquatic areas near the coast in Georgia, range includes all of our Coastal Plain.
- 6. C. pseudovegetus Steud.—Fairly common in shallow waters, mostly in Coastal Plain, Florida north and west to beyond the limits of our area. In addition to the six species of Cyperus here enumerated, there are several others which may occasionally be found in aquatic habitats.

## 3. Fimbristylis Vahl

1. Achene lenticular	1. F. annua.
1. Achene 3-angled	2.
2. Spikelets subglobose	
2. Spikelets narrowly linear	3. F. autumnalis.

- 1. F. annua (All.) R. & S.—Noted in shallow water along the coast, introduced Coastal Plain species, Florida to Georgia and westward to beyond the limits of our territory.
- 2. F. miliacea Vahl—Introduced species, collected by the senior writer from several stations near the coast in Georgia, also known to occur in North Florida.
- 3. F. autumnalis (L.) R. & S.—Common over all of our territory. Variety mucronulata (Michx.) Fernald is the only form which the writers have encountered. There are in addition perhaps one or two unlisted species of this genus which may occasionally be found in fresh water.

#### 4. Eleocharis R. Brown

- Spikelets little or no thicker than the stem; scales 2. mostly leathery.
- Spikelets much thicker than the stem; scales mostly 7. membraneous.
  - Stem with definite septa making it appear 3. nodose.
  - 2. Stem not nodose-septate\_\_\_\_\_4.

3	. Septa becoming much closer together near top of stem; perianth-bristles longer than achene.	1. E. interstincta.
3.	Septa evenly spaced; perianth-bristles shorter than the achene.	2. E. equisetoides.
	4. Stem definitely 3 or 4-angled	F
_	4. Stem round or sometimes flattened	b.
5.	Stem 4-angled, stout, mostly over 2 mm. in diameter	3. E. quadrangulata.
5.	Stem 3-angled, about 1 mm. in diameter	
	6. Stem stout, round, over 2 mm. in diameter	
	6. Stem round or sometimes flattened, about 1 mm. in diameter.	
7.	Achenes lenticular; 2-sided	8.
	Achenes 3-angled	
	8. Tubercle of achene lamelliform (plate-like)	
	8. Tubercle of achene not lamelliform	
a	Sheaths at base of stem firm at the apex	
	Sheaths at base of stem membraneous at apex	
9.	10. Plants perennial from elongated rootstocks	
	10. Plants tufted and annual, without conspicu-	12.
	ous rootstocks.	
11.	Tips of spikelet scales spreading; 2 or 3 non-fertile	8. E. smallii.
	scales at base of spikelet.	
11.	Tips of spikelet scales erect; 1 non-fertile scale present	9. E. calva.
	at base of spikelet and this entirely encircles the	
	base.	
	12. Achene 1 mm. long	
	12. Achene 0.5 mm. long	11. E. atropurpurea.
13.	Mature achene olive colored	12. E. olivacea.
13.	Mature achene black or deep-brown	13. E. flavescens.
	14. Achene cancellate; that is the surface formed	15.
	into small cells.	
	14. Achene smooth, papillose, or irregularly ridged.	18.
15	Achene with longitudinal ribs	14 F acienlania
	Achene with longitudinal ribs	
10.		
	16. Achene 1 mm. or less long; stems often	15. E. vivipara.
	proliferous.	177
	16. Achene at least 1.5 mm. long; stems not proliferous.	
17.	Tubercle as large as the achene or larger, mitre-like	16. E. tuberculosa.
17.	Tubercle smaller than achene, conic	
	18. Achenes shining, black, topped by a depressed whitish tubercle.	18. E. melanocarpa.
	18. Achenes not black	19.
10	Achenes with the 3 angles ribbed.	
	Achenes with the angles not ribbed.	
13.	20. Spikelets obviously distichous; that is, scales	20. F haldenimie
		20. D. oatawinii.
	of spikelets in 2-ranks.	21 F migrassums
	20. Spikelets scales not 2-ranked	21. E. microcarpa.

1. E. interstincta (Vahl) R. & S. Spikerush—Tropical species known from two Florida counties but probably occurs more widely in that State. The senior writer collected it from marshes near Lake Okeechobee in Glades County.

2. E. equisetoides (Ell.) Torr. Knotted Spikerush—Chiefly Coastal Plain, should occur over most of our territory. In Georgia most often seen in acid, open ponds.

3. E. quadrangulata (Michx.) R. & S. Square-stemmed Spikerush—Ponds and marshes, chiefly Coastal Plain. Not definitely recorded from Florida, Alabama, or Mississippi, but may occur in these as well as our other states. In Georgia found mostly along the coast but at least one inland station, a grassy limesink, was observed.

4. E. robbinsii Oakes—Occurs widely on the Coastal Plain over all of our territory, observed by the senior writer mostly in acid, open

limesink ponds.

- 5. E. cellulosa Torr.—Confined to areas along the coast in Florida, Georgia, Mississippi, and probably Alabama. In Florida frequently seen in acid freshwater ponds just behind the dunes along the Gulf of Mexico.
- 6. E. elongata Chapm.—Noted by the senior author with the preceding in the Gulf region of North Florida, and collected from the Okefinokee Swamp and from acid, open limesinks in Georgia. Occurs also in South Alabama, but its range in our territory is not extensive.

7. E. obtusa (Willd.) Schultes—One of the most frequent of our Spikerushes, usually occurs at the margins of ponds or in swamps

and muddy places, range includes all of our territory.

- 8. E. smallii Britton—Northern range but recently collected from Tennessee by Dr. H. K. Svenson in the Interior Low Plateaus. A collection from Meadow Pond near Wilson Reservior in North Alabama by T. F. Hall has been determined as this species by Dr. Svenson, and it may prove to have an even wider distribution in our territory.
- 9. E. calva Torr.—Known in our area from Florida (no locality given on collection), South Carolina, and Middle Tennessee. It, too, may prove to have an even wider distribution, as it is difficult to identify.
- 10. E. geniculata (L.) R. & S.—Usually not strictly aquatic but occurs marginal to freshwater areas in Florida and has been recorded once from South Carolina.
- 11. E. atropurpurea (Retz.) Kunth—Has been recorded from wet places in the Coastal Plain of Georgia and Florida.
- 12. E. olivacea Torr.—Infrequent, not seen by the writers. Has been collected so seldom in the Southeast that it is difficult to characterize its distribution.
- 13. E. flavescens (Poir.) Urban—Coastal Plain, most frequently along the coast, Florida north and west to the limits of our territory.
- 14. E. acicularis R. & S.—Rare in our territory but occurs in most of the States. The senior author collected it once from an acid, open limesink pond in South Georgia.

- 15. E. vivipara Link—Very rarely flowers and so is difficult to identify, forms proliferating mats at the surface of ponds, very likely more common than the records indicate. Coastal Plain in distribution, range extends beyond the limits of our territory, not definitely recorded from Alabama or Mississippi.
- 16. E. tuberculosa (Michx.) R. & S.—One of the most frequent of the Coastal Plain Spikerushes, easily identified by the enormous tubercle of its achene. Usually in very shallow water or in moist marginal situations, often in acid soil; range includes all of our Coastal Plain.
- 17. E. tortilis (Link) Schultes—Much less common than the preceding, primarily Coastal Plain but also in the Piedmont over most of our territory.
- 18. E. melanocarpa Torr.—Distinctive species, known only from South Georgia and North Florida, perhaps because of a lack of data. It has been observed mostly in acid situations.
- 19. E. tricostata Torr.—Coastal Plain, South Georgia and North Florida, also known beyond the limits of our territory.
- 20. E. baldwinii (Torr.) Chapm.—Collected frequently only in Florida and South Georgia, single record for North Carolina. Frequents mostly pine-barrens, noted proliferating in open, grassy limesink ponds.
- 21. E. microcarva Torr.—Has been collected from all of our States, common in acid moist places in the Coastal Plain. It has two well-marked varieties which are more wide-ranging than the typical plant.

## 5. Scirpus L.

- - 5. Scales of spikelet awned, bract much surpass- 3. S. americanus. ing inflorescence; spikelet acute.
  - Scales of spikelet mucronate; bract only 4. S. olneyi. slightly surpassing the inflorescence; spikelets obtuse.
  - 6. Stems sharply 3-angled; leaves (also 3- 5. S. etuberculatus. angled) as long as scape.
  - 6. Stems round; leaves reduced to mere sheaths... 7.

- 7. Achene gray, reddish, or black, abruptly acuminate \_\_\_ 6. S. validus. 7. Achene nearly white, narrowed to short tip\_\_\_\_\_\_ 7. S. californicus. 8. Spikelets crowded into 1-several globose 8. S. cubensis. heads. 8. Spikelets not crowded into globose heads\_\_\_\_ 9. 9. Perianth-bristles downwardly barbed or wanting\_\_\_\_\_ 10. 9. Perianth-bristles smooth or occasionally with a few ascending hairs. 10. Perianth-bristles wanting 9. S. georgianus. 10. Perianth-bristles present\_\_\_\_\_\_11. 11. Perianth-bristles twice as long as the achene \_\_\_\_\_ 10. S. polyphyllus. 11. Perianth-bristles not exceeding achene in length \_\_\_\_\_ 12. 12. Spikelets 3-8 in each head; scales obtuse; 11. S. sylvaticus. lower leaf-sheaths red-tinged; perianthbristles barbed to base. 12. Spikelets 8-20 in each head; scales acute; 12. S. atrovirens. lower leaf-sheaths green; perianth-bristles not barbed near base. 13. Perianth-bristles at maturity scarcely if at all exceeding the scales. 13. Perianth-bristles at maturity greatly exceeding scales 13. S. eriophorum. making spikelet appear wooly. 14. Perianth-bristles about equalling achene; 15.
  - scales acute.
  - 14. Perianth-bristles about twice as long as 14. S. lineatus. achene; scales mucronate.
- 15. Spikelets 1 mm. thick; achene not papillose; inflores- 15. S. divaricatus. cence terminal only.
- 15. Spikelets 2-3 mm. thick; achenes papillose; inflores- 16. S. fontinalis. cence terminal and lateral.
- 1. S. subterminalis Torr.—Probably occurs in western part of our range, not noted by the writers.
- 2. S. debilis Pursh-Swamps mostly in the northern parts of our territory.
- 3. S. americanus Pers. Three-square Bulrush-Should occur over all of our territory, uncommon except along the coast, noted in marshes in the Everglades of Florida.
- 4. S. olneyi A. Gray-Supposed to occur in our territory from Florida north but not observed by the writers. Probably will be found along the coast.
- 5. S. etuberculatus (Steud.) Kuntze-Mostly Coastal Plain, in acid limesinks in Georgia and South Carolina, not frequent, ranges from Florida north and west to beyond the limits of our territory.
- 6. S. validus Vahl. Great Bulrush—Range covers all of our territory, observed mostly along the coast, but occurs in hard waters inland.
- 7. S. californicus (C. A. Meyer) Britton—Similar in appearance to the preceding, occurs in the southernmost part of our territory from Florida westward, common in marshes along some parts of the Gulf of Mexico.

- 8. S. cubensis Poepp. and Kunth—Introduced species, simulating Cyperus, found in the southernmost part of our territory from Florida westward.
- 9. S. georgianus Harper—Swamps in the northern part of our territory. Some authorities consider it merely a variety of S. atrovirens (#12).
- 10. S. polyphyllus Vahl—Range similar to preceding but more common.
- 11. S. sylvaticus L.—Also present only in the northern part of our territory.
- 12. S. atrovirens Muhl.—Another of the more northerly ranging group of Scirpus. None of the preceding four has been encountered often in the Coastal Plain by the writers.
- 13. S. eriophorum Michx. Wool-grass—Very frequent in our territory in a variety of aquatic situations. Has been found in extremely acid places, in alluvial swamps, and basic artesian ponds. Its close relative, S. cyperinus (L.) Kunth, with sessile instead of pedicelled spikelets, may be present in the northern part of our territory. Its range includes all of our States.
- 14. S. lineatus Michx.—Range includes all of our territory, should occur in swamps.
- 15. S. divaricatus Ell.—Mostly in swamps of creeks and rivers in the Coastal Plain, Florida north and west to beyond the limits of our territory.
- 16. S. fontinalis Harper—Known in our territory only from springy pond margins in the Coastal Plain of Georgia, may occur more widely for a variety of the species has recently been described from the Virginia Coastal Plain.

### 6. Fuirena Rottb.

- 1. Leaves reduced to mere sheaths \_\_\_\_\_\_ 1. F. scirpoidea.
- 1. Leaves with well-developed blades\_\_\_\_\_\_2.
  - 2. Plants annual, without rhizomes; perianth- 2. F. pumila. bristles equalling or exceeding the achene.
  - Plants perennial, with rhizomes; perianthbristles only reaching the middle of achene or shorter.
- 3. Perianth-bristles very short, not exceeding the stipe of 3. F. breviseta. the achene; perianth-scales orbicular or reniform.
- 3. Perianth-bristles reaching the middle of the achene; 4. F. squarrosa. perianth scales deltoid-ovate
- 1. F. scirpoidea Michx.—Strictly Coastal Plain in distribution, Florida, South Georgia, and probably South Alabama and Mississippi. A similar species, F. longa Chapm. in which the upper leaf-sheaths bear leaves, occurs from West Florida to Mississippi but is not definitely aquatic.

- 2. F. pumila Torr. Umbrella-grass—Mostly of Coastal Plain distribution, supposed to occur most frequently in brackish marshes, but collected from acid pond margins. Ranges from Florida to north of our territory.
- 3. F. breviseta Coville—Common in Coastal Plain, Florida north and west to the limits of our territory.
- 4. F. squarrosa Michx.—Difficult to distinguish superficially from the preceding. Found also in acid places, Coastal Plain, Florida north and west to beyond the limits of our territory.

#### 7. Dichromena Michx.

- Bracts subtending flower clusters 4-6, linear; tubercle 1. D. colorata. not decurrent on the sides of the achene.
- Bracts 7-10, lanceolate; tubercle decurrent on sides of 2. D. latifolia. achene.
- 1. D. colorata (L.) Hitchc. White-top Rush—Coastal Plain, Florida north and west to beyond the limits of our territory in less acid situations than the following species. Common along the coast.
- 2. D. latifolia Baldw.—Range similar to preceding, habitat more acid.

### 8. Psilocarya Torr.

- 1. Tubercle higher than wide, as long or nearly as long as 1. P. corymbifera. achene, somewhat decurrent.
- Tubercle broader than long, much shorter than achene, 2. P. nitens. not decurrent.
- 1. P. corymbifera (C. Wright) Britton—Around ponds in acid situations, Coastal Plain, Florida, Georgia, and probably Alabama and Mississippi.
- 2. P. nitens (Vahl) Wood. Bald-rush—Similar situations to the above but more widespread, Florida north and west to beyond the limits of our territory. A third species, P. scirpoides Torr., may enter our territory in North Carolina, and the senior writer has one or two Georgia specimens which have been determined as this.

## 9. Rhynchospora Vahl

- 3. Perianth-bristles shorter than achene\_\_\_\_\_\_ 2. R. corniculata.
- - 4. Plant stoloniferous; spikelets few in each 5. cluster.

5. Achene ellipsoid-obovate, much longer than wide	
5. Achene broadly-obovate, slightly longer than wide	
6. Perianth-bristles wanting or very short	
6. Perianth-bristles well-developed	
7. Achene transversely wrinkled	
7. Achene smooth	
8. Perianth-bristles downwardly barbed	9.
8. Perianth-bristles upwardly barbed	
9. Clusters of spikelets loose.	10.
9. Spikelets in dense globose heads	
10. Achene 1.5-2 mm. long; panicles rather loose;	8. R. glomerata.
if achene is 1.5 mm. long spikelets 2-3 flow-	
ered.	
10. Achene 1.5 mm. long, panicles dense; spikelets	9. R. chalarocephala.
with 1 perfect flower.	
11. Achenes 2.5 mm. long; spikelets 5-6 mm. long	10. R. cephalantha.
11. Achenes about 1.5 mm. long; spikelets 3-3.5 mm. long_	
12. Heads not truly globose, not tightly com-	
pacted; basal leaves 1-2 mm. wide, invo-	
lute.	
12. Heads very compact and globose; basal	11. R. microcephala.
leaves 1.5-3 mm. wide, flat.	*
13. Achenes smooth or cancellate, not transversely	14.
wrinkled.	
13. Achenes transversely wrinkled	20.
14. Achenes cancellate	
14. Achenes smooth	
15. Tubercle of achene serrulate to ciliate	
15. Tubercle of achene smooth or granular	
16. Achene 1 mm. long, light brown	
16. Achene 1.5-2 mm. long, dark brown	* *
17. Achenes narrowly obovoid, much less than 1 mm.	
wide.	
17. Achene broadly obovoid, about 1 mm. wide	15. R. harveri.
18. Perianth-bristles much longer than achene.	
18. Perianth-bristles much shorter than achene	
19. Leaf-blades linear; spikelets 4-5 mm. long	
19. Leaf-blades bristle-like, filiform; spikelets 2.5–3 mm.	18 R wrightiana
long.	10. It. wrightfullaria.
20. Perianth-bristles shorter than the achene	21
20. Perianth-bristles as long as achene or longer	
21. Leaf-blades involute	
21. Leaf-blades flat	
22. Achene biconvex, not constricted under	
tubercle.	
22. Achene compressed, constricted under	20. R. compressa.
tubercle.	20. 20. 00 mproood.
23. Achene 1 mm. long; tubercle wider than high	24.
23. Achene 1.5 mm. long; tuber cle wider than ingin	
24. Achene ellipsoidal, manifestly longer than	22. R. edisoniana.
broad, finely wrinkled.	
24. Achene nearly orbicular, about as long as	25.
broad, coarsely wrinkled.	
oroug, company writing.	

25. Inflorescence with many spikelets, more or less nodding; tubercle confluent with achene body.	23. R. perplexa.
25. Inflorescence with few spikelets; tubercle with a ring- like base, sharply differentiated from achene body.	24. R. globularis.
26. Achene constricted at base to a stipe	25. R. stipitata.
26. Achene not stipitate	27.
27. Clusters of spikelets on erect or ascending stalks	28.
27. Clusters of spikelets with divaricate stalks	26. R. miliacea.
28. Tubercle not setose	29.
28. Tubercle setose	31.
29. Perianth-bristles about as long as achene but shorter than tubercle.	30.
29. Perianth-bristles as long as achene and tubercle	27. R. schoenoides.
30. Tubercle blunt, achene orbicular	28. R. microcarpa.
30. Tubercle sharp-pointed, achene ellipsoidal	20. R. decurrens.
31. Perianth-bristles not longer than achene and tubercle	
31. Perianth-bristles longer than achene and tubercle	32.

32. Achene narrowly obovoid \_\_\_\_\_ 32. R. mixta. 1. R. tracyi Britton—Coastal Plain pineland ponds and swamps, Florida to Georgia and Mississippi.

32. Achene broadly obovoid or orbicular obovoid\_ 31. R. caduca.

2. R. corniculata (Lam.) A. Gray-Mostly on the Coastal Plain over most of our territory. A variety, interior Fernald, is found in the western part of our range.

3. R. macrostachya Torr.—Found in a variety of aquatic situations, range includes all of our territory.

4. R. inundata (Oakes) Fernald-Coastal Plain, probably most common in the eastern part of our territory.

5. R. careyana Fernald-Coastal Plain, recorded in the literature only from Florida. The senior author has collected it also in South Georgia.

6. R. intermixta C. Wright-Pineland ponds and swamps in the southern part of our territory, Florida westward along the Gulf to beyond the limits of our territory.

7. R. chapmanii M. A. Curtis—Coastal Plain in acid situations, Florida to North Carolina and Louisiana.

8. R. glomerata (L.) Vahl-As used here, includes R. capitellata (Michx.) Vahl and R. leptocarpa (Chapm.) Small. Ranges over all of our territory, common mostly in acid situations especially in the Coastal Plain.

9. R. chalarocephala Fernald & Gale—Recently described species, acid ponds, Virginia south to South Carolina. May prove to have a wider distribution.

10. R. cephalantha A. Gray—Acid ponds and swamps, Coastal Plain, over most of our territory.

11. R. microcephala Britton—Similar species, distribution very like that of the preceding.

- 12. R. harveyi W. Boott—Georgia to Virginia and westward, infrequent.
- 13. R. filifolia Torr.—Acid ponds in the pine-barrens, Coastal Plain, Florida to North Carolina and westward along the Gulf to beyond the limit of our territory.
- 14. R. fusca (L.) Ait. f.—Distribution similar to that of the preceding.
- 15. R. harperi Small—Known only from pineland ponds in the Coastal Plain of Georgia.
- 16. R. gracilenta A. Gray—Acid ponds and swamps, mostly in the Coastal Plain, Florida north and west beyond the limits of our territory. One of the more frequent species of the genus.
- 17. R. fascicularis (Michx.) Vahl—Low pinelands and pineland ponds, Coastal Plain, Florida to North Carolina and westward to the limit of our range.
- 18. R. wrightiana Boeckl.—Coastal Plain in acid situations, Florida north to North Carolina.
- 19. R. torreyana A. Gray—Acid swamps, Coastal Plain, Georgia to the northern limit of our territory.
- 20. R. compressa Carey—Pineland ponds, Coastal Plain, Florida to Georgia and westward.
- 21. R. cymosa Ell.—Various provinces, range covers all of our territory.
  - 22. R. edisoniana Britton-Ponds and swamps of peninsular Florida.
- 23. R. perplexa Britton—Coastal Plain swamps, Florida to North Carolina and Louisiana.
- 24. R. globularis (Chapm.) Small—Coastal Plain pinelands, Florida north and west to the limits of our territory.
- 25. R. stipitata Chapm.—Coastal Plain pineland swamps, Florida to North Carolina and Louisiana.
- 26. R. miliacea (Lam.) A. Gray—Pond margins mostly in calcareous areas, Coastal Plain, Florida to North Carolina and Louisiana.
- 27. R. schoenoides (Ell.) Britton—Pond margins, Coastal Plain, Florida to North Carolina and Louisiana.
- 28. R. microcarpa Baldw.—Acid pineland ponds, Coastal Plain, Florida to North Carolina and westward along the Gulf to beyond the limits of our territory.
- 29. R. decurrens Chapm.—Known only from swamps in West Florida.
- 30. R. patula A. Gray—Acid pineland swamps, Coastal Plain, Florida north to North Carolina and west to Mississippi.
- 31. R. caduca Ell.—Swamps, mostly Coastal Plain, Florida to North Carolina and west beyond the limits of territory.
- 32. R. mixta Britton—Coastal Plain swamps and ponds, Florida to Georgia and westward beyond the limit of our range.

### 10. Cladium P. Browne

- 1. Leaves smooth and unarmed\_\_\_\_\_\_ 1. C. mariscoides. 1. Leaves spinulose on margins and midribs beneath\_\_\_\_ 2. C. jamaicensis.
- 1. C. mariscoides (Muhl.) Torr.—Not observed by the writers, but
- supposed to occur south to Florida in our territory.
- 2. C. jamaicensis Crantz. Saw-grass—The famous vicious Sawgrass of the Everglades, occurs also along the coast to the limits of our territory. Most common in Florida and along the Gulf of Mexico in fresh to brackish situations. Both of these species are placed in the genus Mariscus by Small.

### 11. Scleria Berg.

1. Achene bearing a disk-like body (hypogynum) below	2.
1. Achene without a hypogynum	3.
2. Achene body reticulate	1. S. muhlenbergii.
2. Achene body papillose	2. S. pauciflora.
3. Spikelets in a single terminal cluster	4.
3. Spikelets in several distant clusters along the upper	5.
part of the stem.	
4. Achene 3 mm. long or less with a pair of	3. S. georgiana.

- prominent pits on each side of base.
- 4. Achene over 3 mm. long, without prominent 4. S. baldwinii. pits on each side of base.
- 5. Achene papillose-ridged; bracts merely serrulate near 5. S. verticillata.
- 5. Achene smooth; bracts with long spreading hairs near 6. S. hirtella.
- 1. S. muhlenbergii Steud.—Acid aquatic areas, should be well distributed over our territory, especially in the Coastal plain.
- 2. S. pauciflora Muhl.—Should be distributed much as the preceding.
- 3. S. georgiana Core-Acid places, Coastal Plain, north in our territory to South Carolina. Cited by Small. as S. gracilis Ell.
- 4. S. baldwinii (Torr.) Steud.—Coastal Plain, found only in the Southernmost part of our territory from Florida westward along the Gulf.
- 5. S. verticillata Muhl.—Coastal Plain, Florida north and west beyond the limits of our territory.
- 6. S. hirtella Swartz—Coastal Plain, north only to South Carolina but westward beyond the limits of our range.

## 12. Carex [Rupp.] L.

1.	Achenes lenticular; styles 2	2.
1.	Achenes 3-sided; styles 3	11.
	2. Lateral spikes sessile	3.
	2. Lateral spikes stalked	1. C. stricta.
3.	Spikes with staminate flowers uppermost	4.
3.	Spikes with pistillate flowers uppermost (lower spikes	
	sometimes all pistillate)	6.

	4. Perigynium abruptly contracted to a beak	
_	4. Perigynium gradually narrowed to a beak	
5.	Perigynium yellowish; opaque part of leaf-sheath transversely-wrinkled	2 C vulningidea
5	Perigynium brownish; opaque part of leaf-sheath not	
0.	wrinkled	
	6. Wing of perigynium abruptly narrowed near	•
	the middle of body	
	6. Wing of perigynium not narrowed near middle	
_	of body	
7.	Scales of spikelet obtuse or acute; achenes not slenderly	
7	stipitateScales of spikelet long-accuminate to aristate; achenes	
1.	slenderly stipitate	
	8. Tips of perigynia appressed	
	8. Tips of perigynia spreading	
9.	Perigynium 4 to 6 mm. long, without a disk-like base;	
	beak 1 to 2 times length of body; leaf-sheaths not	
	red-dotted within	10.
9.	Perigynium 6 to 7 mm. long, with a hard disk-like	
	base; beak 2-3 times length of body; leaf-sheaths red-dotted within	o C amora a amora
	10. Sheaths transversely wrinkled within, easily	a. C. crus-corvi.
	broken, not thickened at mouth.	9 C stingta.
	io. Sheaths not transversely wrinkled within, not	0. 0. o. p. a. a.
	easily broken, thickened at mouth	10. C. laevi-vaginata.
11.	Lowest bract strongly green-sheathing; beak of peri-	
	gynium bidentate, but with weak teeth.	11. C. cherokeensis.
11.	Lowest bract not strongly green-sheathing, or if so peri-	10
	gynium with strongly bidentate apex with stiff teeth	
	12. Perigynium beakless or very short beaked	13.
	bidentate	17.
13.	Terminal spike, if staminate, without rough-awned	***
	scales	14.
13.	Terminal spike staminate; scales rough-awned	15.
	14. Terminal spike staminate; lateral spikes slen-	
	der-stalked, the lower drooping; pistillate	
	scales obtuse or acute, shorter than the	10 (1 1
	perigynia14. Terminal spike with pistillate flowers upper-	12. C. oarraun.
	most; lateral spikes short-stalked or sessile,	
	erect; pistillate scales strongly awned, ex-	
	ceeding the perigynia	13. C. buxbuamii.
15.	Perigynium strongly ribbed; staminate scales gradu-	
	ally awned	
15.	Perigynium nerved; staminate scales abruptly awned_	16.
	16. Pistillate spikes erect; perigynium strongly	15 0
	nerved	15. C. verrucosa.
	scurely nerved	16. C. alaucescens.
17.	Style jointed with achene.	
	Style continuous with achene	

<ul><li>18. Perigynium coriaceous with impressed nerves.</li><li>18. Perigynium membranous, the nerves or ribs not impressed.</li></ul>	18. C. hyalinolepis. 19.
19. Perigynium lanceolate, tapering into the beak, many nerved.	20.
19. Perigynium broader; abruptly contracted into the	21.
beak, usually strongly ribbed.	
20. Perigynium teeth reflexed, green	
20. Perigynium teeth not reflexed, yellowish-green.	
21. Perigynium less than 1 cm. long	22.
21. Perigynium more than 1 cm. long	
22. Perigynium body ovoid or globose, but not truncately contracted into beak.	23.
22. Perigynium body obovoid or obconic, trun-	20.
cately contracted into the prominent	20.
beak.	
23. Perigynium coarsely ribbed or nerveless	24.
23. Perigynium finely and closely ribbed	
24. Pistillate scales rough-awned	
24. Pistillate scales not rough-awned	
25. Perigynium abruptly beaked, strongly inflated; pistillate spikes 20-40 flowered.	23. C. bullata.
25. Perigynium less abruptly beaked, not strongly in-	24. C. elliottii.
flated; spikes 10-20 flowered	
26. Pistillate spikes globose or subglobose; style	27.
straight; stolons short, ascending.	
26. Pistillate spikes oblong or cylindric; style	28.
abruptly bent; stolons long, horizontal.	0° 0 :nt
27. Perigynium rounded at base, shining; leaf-blades 2.5-8 mm. wide, their sheaths short prolonged upward at	25. C. intumescens.
mouth beyond base of leaf-blade.	
27. Perigynium cuneate at base, dull, often hispidulous;	26. C. grayi.
leaf-blades 4.5-14 mm. wide; sheath not prolonged.	20, 01 g. ag.
28. Perigynium ascending; beak less than twice	29.
length of body.	
28. Perigynium spreading at right angles to spike	27. C. gigantea.
axis; beak 2-3 times length of body.	
29. Stems in tufts; leaf-blades 4-12 mm. wide	28. C. lupulina.
29. Stems arising singly from elongate rootstock; leaf- blades 2-5 mm, wide.	29. C. louisianica.
30. Scales exceeding perigynia; achenes about	30. C. frankii.
1.5 mm. long.	oo. o. jrannii.
30. Scales much shorter than perigynia; achenes	31.
2.2-3 mm. long.	
31. Beaks of perigynia appressed ascending; style straight	31. C. typhina.
below; achenes obovoid with concave sides.	
31. Beaks of perigynia widely radiating; style strongly	32. C. squarrosa.
curved or bent below; achenes linear-oval with flat	
sides.	

1. C. stricta Lam.—This tussock-forming species and its variety striction (Dewey) Carey occur only in the most northern part of our

territory. The related *C. torta* Boott is found in our territory but was not included because it does not inhabit still waters.

- 2. C. vulpinoidea Michx.—Moist places, various provinces over most of our territory.
- 3. C. decomposita Muhl.—Rare species, various provinces, south to Florida. Collected from logs in Reelfoot Lake, Tennessee, by the senior author.
- 4. C. tribuloides Wahlenb.—Various provinces over all of our territory.
- 5. C. alata Torr.—Supposed to occur mostly along the coast or in calcareous regions mostly in the Coastal Plain, over all of our territory.
- 6. C. longii Mackenzie—Coastal Plain, apparently prefering acid situations, should be found in most of our states.
  - 7. C. albolutescens Schk.—Range includes all of our territory.
- 8. C. crus-corvi Shuttlw.—Enters our territory from the west but is found all the way to Florida, seems to prefer neutral soils.
- 9. C. stipiata Muhl.—This includes also variety maxima Bailey which is the frequent form in our territory. Occurs in neutral soils and has been collected from alluvial areas.
- 10. C. laevi-vaginata (Kukenth.) Mackenzie—Should range over most of our territory but has not been noted by the writers.
- 11. C. cherokeensis Schwein.—Swamps, Coastal Plain, Florida to Georgia and westward.
- 12. C. barrattii Schwein. & Torr.—Said to occur in very acid swamps and bogs, Coastal Plain, south to North Carolina.
- 13. C. buxbaumii Wahlenb.—Said to occur in swamps in calcareous regions, various provinces, south to Georgia. Neither this nor the preceding species has been noted by the writers.
- 14. C. joorii Bailey—Coastal Plain, Florida to South Carolina and westward in acid cypress ponds and swamps.
- 15. C. verrucosa Muhl.—Coastal Plain in acid ponds and swamps, distribution almost identical to preceding in our territory.
- 16. C. glaucescens Ell.—Acid ponds and swamps, Coastal Plain, perhaps more common than the two preceding species. Range similar, but found northward to Virginia.
- 17. C. walteriana Bailey—Acid ponds and swamps, Coastal Plain, in the eastern part of our territory south to Florida. A related species C. lanuginosa Michx. may enter our territory in the north.
- 18. C. hyalinolepis Steud.—Neutral swamps over most of our area. The closely related C. riparia Curtis variety lacustris (Willd.) Kukenth. enters our territory in Tennessee.
- 19. C. collinsii Nutt.—Very acid swamps, Coastal Plain, in the eastern portion of our range from Georgia north.

- 20. C. lonchocarpa Willd:—Swamps, Coastal Plain, Florida to South Carolina and westward. The closely related C. folliculata L. also probably enters our territory in the north.
- 21. C. comosa Boott—Swamps, various provinces, Florida north. Collected by the senior author in our territory mostly in alluvial situations.
- 22. C. lurida Wahlenb.—Swampy areas, over all of our territory. Apparently has no marked soil preference and is very frequent.
- 23. C. bullata Schk.—Coastal Plain in the eastern part of our area. Has been taken from river swamps but is said to occur in acid, swampy meadows.
- 24. C. elliottii Schwein & Torr.—Coastal Plain, Florida to Alabama and North Carolina in very acid places, infrequent.
- 25. C. intumescens Rudge—Branch swamps and river swamps, various provinces over all of our range.
- 26. C. grayi Bailey—Various provinces, Georgia north, seeming to prefer neutral soils.
- 27. C. gigantea Rudge—Acid ponds or swamps, Coastal Plain and occasionally adjacent provinces over most of our territory.
- 28. C. lupulina Muhl.—Swamps, various provinces, over all of our territory.
- 29. C. louisianica Bailey—Said to occur mostly in the Coastal Plain, range includes all of our territory.
- 30. C. frankii Kunth—Northern part of our territory in calcareous soils.
- 31. C. typhina Michx.—Most characteristic of calcareous districts, various provinces, Georgia north and west.
- 32. C. squarrosa L.—Mostly in the northern part of our territory-being known from North Carolina and Tennessee. There is one recorded occurrence in a river swamp in the Coastal Plain of Georgia. In addition to the above 32 species of Carex there are perhaps a few others which are either only occasionally aquatic or which enter our range in its northern part.

## ARACEAE Arum family

#### 1. Acorus L.

A. calamus L. Sweet-flag—Various provinces, range should include all of our area, but very infrequent.

#### 1. Orontium L.

O. aquaticum L. Never-wet—Most frequently found along sluggish creeks or rivers or in alluvial swamps, also present in the very acid Okefinokee Swamp and in other non-alluvial aquatic situations. Range covers all of the Coastal Plain of our territory. Anopheles quadrimaculatus can often be found associated.

#### 3. Peltandra Raf.

- 1. Spathe narrow, green throughout; fruits green \_\_\_\_\_ 1. P. virginica.
- 1. Spathe broad and spreading, mostly white; fruits 2. P. glauca. crimson.
- 1. P. virginica (L.) Kunth Arrow-arum—Well distributed in swamps and shallow water over all of our territory, frequent.
- 2. P. glauca (Ell.) Feay. White Arrow-arum—Very acid swamps or ponds, Coastal Plain, Florida to Alabama and North Carolina. Not nearly as frequent as the preceding.

#### 4. Pistia L.

P. stratiotes L. Water-Lettuce—Floating plant very often forming a complete carpet on streams, lakes and ponds in the Coastal Plain in Florida. Found westward to Louisiana and may be present in Alabama and Mississippi. It is very often in association with species of Mansonia.

# LEMNACEAE Duckweed family

#### 1. Wolffia Horkel

- Plant rounded on back; not covered with minute brown dots.
   W. columbiana.
- 1. Plant flat on back; covered with minute brown dots\_\_\_\_ 2. W. punctata.
- 1. W. columbiana Karst. Watermeal—Smallest, with the next, of our flowering plants. When abundant, they form a granular layer on the surface of ponds or lakes. Both this and the following species are well distributed over our territory.
- 2. W. punctata Griseb. Watermeal—All that has been said of the preceding applies to this species except that it has not been as frequently noted. These two species are listed under Bruneria by Small.

#### 2. Wolffiella Hegel

W.floridana (J. D. Smith) C. H. Thompson. Bog-mat—Very common, even in very acid waters, in the Coastal Plain of our territory. It has been taken as far north as Reelfoot Lake, Tennessee, in the Mississippi Valley.

#### 3. Lemna L.

- Joints or disks long, narrow and stalked; plants com 1. L. trisulca.
   monly forming masses below surface of water.
- 1. Joints not stalked; floating on surface of water\_\_\_\_\_ 2.
  - 2. Joints symmetrical or nearly so\_\_\_\_\_\_ 3.
  - 2. Joints asymmetrical 4.
- 3. Joints elliptic-obovate 2-4 mm. long; fruit lenticular\_\_\_\_ 2. L. minor.
- 3. Joints elliptic or oblong 1.5-3.9 mm. long; fruit elongate\_ 3. L. minima.

- 4. Joints with unequally rounded sides, thick, 3- 4. L. perpusilla. nerved or -veined.
- 4. Joints with parallel sides, thin, 1-nerved or 5. L. valdiviana. -veined.
- 1. L. trisulca L. Star Duckweed—Found in only the western part of our territory, not noted by the writers.
- 2. L. minor L. Duckweed—Extremely difficult to distinguish from the following species except in fruit, and fruits very rarely in nature. The range of this species includes all of our territory, and it is common. A dense covering of this plant often inhibits mosquito breeding, but partial growths often harbor Anopheles quadrimaculatus larvae.
- 3. L. minima Philippi—The remarks under the preceding apply alike to this species, although its distribution is probably more limited.
  - 4. L. perpusilla Torr.—Ponds, range includes all of our territory.
- 5. L. valdiviana Philippi—The remarks under the preceding species apply also to this.

#### 4. Spirodela Schleid.

S. polyrhiza (L.) Schleid.—This easily recognized, large Duckweed occurs over practically all of our territory and is very frequent. It has often been found in association with Anopheles quadrimaculatus except when in dense, blanket-like growth.

# MAYACACEAE Bog-moss family

#### 1. Mayaca Aubl.

- 1. M. aubleti Michx. Bog-moss—Ranges over most of our Coastal Plain, generally in acid ponds.
- 2. M. fluviatilis Aubl.—Range more restricted, known only from Florida to Georgia and Mississippi. Much less frequent than the preceding species and is considered by some to be only a form of it.

# XYRIDACEAE Yellow-eyed Grass family

# 1. Xyris [Gronov.] L.

- 1. Leaves round, filiform; sterile filaments glabrous\_\_\_\_ 1. X. baldwiniana.
- 1. Leaves flat; sterile filaments bearded...... 2.
  - 2. Lateral sepals included under bracts\_\_\_\_\_\_3.
  - 2. Lateral sepals partially exserted 11.
- 3. Keel or wing of the lateral sepal ciliate 4.
  3. Keel or wing of the lateral sepal incised, cross-toothed 6. or lacerate.
  - Lateral sepals winged, the wing partially 5. ciliate, not bearded.
  - 4. Lateral sepals keeled, the keel mainly cilio- 2. X. torta. late its entire length, bearded at the apex.

- 5. Sepal wing narrow, narrower than the sepal body\_\_\_\_ 3. X. ambigua.
- 5. Sepal wing broad, broader than the sepal body \_\_\_\_\_ 4. X. stricta.
  - 6. Keel or wing cross-toothed or incised\_\_\_\_\_\_7.
- Spikes oblong to conic-oblong, 16-23 mm. long at 5. X. elata. maturity; scales in many series.
  - Bracts loosely imbricate in few series, deciduous.
  - 8. Bracts closely imbricate in several series, 7. X. jupacai. persistent.
- Lateral sepals crested from about the middle or just 10. below it to the apex, the crest erect or nearly so.
- 9. Lateral sepals crested from the base to the apex, the 8. X. iridifolia. crest spreading or partially recurved.
  - Spike acute; lateral sepals with the wing narrow or obsolete near the base; leaves and scape smooth.
  - Spike obtuse; lateral sepals with the wing 10. X. serotina. broad to the base; leaves and scape roughmargined.
- 11. Leaves numerous, blades mostly 1-2 mm. wide at 11. X. elliottii. maturity.
- 11. Leaves few; blades mostly 5-10 mm, wide at maturity\_\_ 12.
  - 12. Crest of the lateral sepals of very short erect 12. X. smalliana. segments; upper part of scape smooth.
  - 12. Crest of the lateral sepals of very long spreading segments; upper part of scape rough.
- 1. X. baldwiniana R. & S. St. Marys-grass—Coastal Plain pineland ponds, Florida to North Carolina and westward to beyond our boundary.
- 2. X. torta J. E. Smith—Of more northern distribution, various provinces, Georgia north and west.
- 3. X. ambigua Beyr.—Swamps in the Coastal Plain, Florida to North Carolina and westward along the Gulf to beyond the limit of our territory.
- 4. X. stricta Chapm.—More southernly in its distribution. Found around pineland pools, Coastal Plain, Florida to Mississippi along the Gulf of Mexico.
- 5. X. elata Chapm.—Florida northward and westward to the limits of our range in Coastal Plain swamps and ponds.
- 6. X. caroliniana Walt. Yellow-eyed Grass—Shallow ponds and swamps, often very acid, Coastal Plain, Florida north and west to the limits of our territory.
- 7. X. jupacai Rich.—Distribution very similar to the preceding. Called X. communis Kunth in many manuals.
- 8. X. iridifolia Chapm.—Shallow ponds, Florida to Georgia and westward mostly in the Coastal Plain.

- 9. X. difformis Chapm.—Swamps, Coastal Plain, Florida, Georgia, and Alabama.
- 10. X. serotina Chapm.—Known only from pineland swamps in Florida and Mississippi.
- 11. X. elliottii Chapm.—Pinelands and swamps, Florida to Virginia in the Coastal Plain.
- 12. X. smalliana Nash—Acid ponds, Coastal Plain, Florida to South Carolina and west to the limit of our territory. Not as common as the following.
- 13. X. fimbriata Ell.—Acid ponds or swamps, Coastal Plain, Florida to Mississippi and northward to the limit of our range.

# ERIOCAULACEAE Pipewort family

### 1. Eriocaulon [Gronov.] L.

- 1. Flower heads, when mature, white villous at summit\_\_\_ 2.
- 1. Flower heads, when mature, brown or blackish\_\_\_\_\_ 1. E. raveneur.
  - 2. Flower heads less than 10 mm. in diameter 2. E. lineare. when mature; scape 3-5 ridged.
  - 2. Flower heads more than 10 mm, in diameter 3. when mature; scape 10-14 ridged.
- 3. Sheath at base of scape surpassing leaves except when 3. E. compressum. plant is submerged; flowers March-April.
- 3. Sheath at base of scape surpassed by leaves; flowers 4. E. decangulare. June-September.
- 1. E. ravenelii Chapm.—Swamps, Coastal Plain, Florida to Mississippi and South Carolina. Apparently the most infrequent of the genus.
- 2. E. lineare Small—Mostly in Coastal Plain pinelands but occasionally in acid swamps or ponds, Florida, Alabama, and Georgia.
- 3. E. compressum Lam. Pipewort—The species of Eriocaulon most frequently found in truly aquatic situations. Occurs in acid ponds in the Coastal Plain over most of our territory.
- 4. E. decangulare L.—Most often found in pine-barrens but occasionally in acid swamps, range similar to that of the preceding species.

# PONTEDERIACEAE Pickerel-weed family

#### 1. Heteranthera R. & P.

- 1. Leaves ribbon-like 1. H. dubia.
- - 2. Leaves as wide as long, lobed at base\_\_\_\_\_ 2. H. reniformis.
  - 2. Leaves longer than wide obtuse at both ends. 3. H. limosa.
- 1. H. dubia (Jacq.) MacM. Water Star-grass—Ponds or lakes, various provinces, over all of our territory. Apparently prefers neutral or alkaline waters, and Anopheles quadrimaculatus is sometimes found associated.

- 2. H. reniformis R. & P. Mud-plantain—Georgia northward and westward, like others of the genus seeming to prefer neutral or alkaline waters.
- 3. H. limosa (Swartz) Willd.—Range embraces all of our territory, but not common.

#### 2. Pontederia L.

P. lanceolata Nutt. Pickerel-weed—All of the Pickerel-weeds observed by the writers in our territory are included under this species, although it may be that P. cordata L. could also be differentiated. One of the most frequent aquatic plants over most of our range and found in a wide variety of aquatic situations. The shape of its leaves varies considerably from linear to very broad and lobed at the base.

#### 3. Eichhornia Kunth

E. crassipes (Mart.) Solms. Water Hyacinth—Coastal Plain, over most of our territory, but most abundant in Florida, Georgia, and westward along the Gulf. In Florida is occasionally so abundant as to impede navigation. Often grows in enormous pure masses and can be found in association with Anopheles quadrimaculatus. Another species, E. paniculatus (Spreng.) Solms, is said to occur in peninsular Florida.

# JUNCACEAE Rush family

#### 1. Juncus [Tourn.] L.

1. Plants creeping or forming mats in or on the surface of the water.	1. J. repens.
1. Plants erect and emergent	2.
2. Stem appearing to continue upward beyond	
inflorescence.	•
2. Inflorescence terminal	4
3. Sheaths at base of stem without leaf-blades	
3. Sheaths at base of stem with round blades	
4. Leaves with node-like septa	
4. Leaves flat without node-like septa	
5. Heads of inflorescence 5-15 flowered; heads usually	4. J. marginatus.
few.	
5. Heads of inflorescence 2-5 flowered; heads usually	5. J. biflorus.
many.	
6. Clusters reduced to only a single flower	6. J. abortivus.
6. Clusters of inflorescence with many flowers	
7. Capsule truly subulate	_
7. Capsule ellipsoid to linear-lanceolate in outline some-	
times acute or mucronate at apex but not truly	
subulate.	
8. Uppermost leaf-sheath with very short blade	7 I meagrephalus
	. o. megacopitatao
or none (at most 1–2 cm. long).	٥
8. Uppermost leaf-sheath with well-developed	9.

blade (3 cm. long or more).

- 9. Stamens as long as petals, the anthers exserted between them.
- 9. Stamens much shorter than petals, included \_\_\_\_\_ 10.
  - Leaf-blades flattened and usually with incomplete septa; capsule manifestly beaked.
  - Leaf-blades only slightly compressed; septa 10. J. validus. complete; capsule beakless.
- 11. Capsule not more than two-thirds as long as perianth. 11. J. brachycarpus.
- 11. Capsule equalling or exceeding the perianth\_\_\_\_\_\_ 12.
  - 12. Seed 0.7-2.5 mm. long, the body tapering 13. at both ends into a white tail.
  - Seed less than 0.55 mm. long with an abrupt 14. usually dark colored tail.
- 13. Capsule scarcely exceeding perianth; plant not rigid\_\_ 12. J. canadensis.
- 13. Capsule exceeding perianth by about half its length; 13. J. trigonocarpus. plant rigid throughout.
  - 14. Capsule exceeding the perianth\_\_\_\_\_ 15.
  - 14. Capsule about equalling the perianth\_\_\_\_\_ 14. J. acuminatus.
- 15. Capsule dark brown at maturity\_\_\_\_\_ 15. J. elliottii.
- 15. Capsule straw-colored at maturity\_\_\_\_\_ 16. J. debilis.
- 1. J. repens Michx.—Various provinces over all of our territory, most common in the Coastal Plain, in very acid as well as nearly neutral waters. It has often been found in association with Anopheles quadrimaculatus.
- 2. J. effusus L. Soft-rush—Perhaps the most frequent species of the genus in our territory. Shows wide tolerance of acidity and has been found in association with Anopheles quadrimaculatus.
- 3. J. coriaceus Mackenzie—Like the preceding ranges over all of our territory, but infrequent and usually confined to springy places.
- 4. J. marginatus Rostk.—Various provinces over all of our territory but noted most frequently near the coast.
- 5. J. biflorus Ell.—Ranges over all our territory. Collected in very acid as well as almost neutral situations.
- 6. J. abortivus Chapm.—Coastal Plain, along margins of ponds, middle Florida to South Carolina.
- 7. J. megacephalus M. A. Curtis—Coastal Plain, Florida to Virginia, mostly in calcareous situations.
- 8. J. scirpoides Lam.—Occurs over all of our Coastal Plain territory, fairly frequent and often in very acid situations.
- 9. J. polycephalus Michx.—Ponds and swamps, Coastal Plain over most of our range.
- 10. J. validus Coville—Should occur only in the westernmost portion of our Coastal Plain; however, the senior author has one collection from South Florida.
- 11. J. brachycarpus Engelm.—Various provinces, Georgia northward and westward. Collected from neutral soil in west Tennessee.
- 12. J. canadensis J. Gay—Various situations, range similar to the preceding.

- 13. J. trigonocarpus Steud.—Acid preferring plant, Coastal Plain, Florida to South Carolina and along the Gulf westward at least to Mississippi.
- 14. J. acuminatus Michx.—Various provinces, Georgia north and west. Seems to show no particular preference as to acidity.
- 15. J. elliottii Chapm.—Coastal Plain, acid swamps or bogs, Florida to North Carolina and westward to the western limit of our territory.
  - 16. J. debilis A. Gray-Various provinces over most of our territory.

# SMILACACEAE Smilax family

### 1. Smilax [Tourn.] L.

- Berries red; leaves not leathery, usually not much 1. S. walteri. longer than broad.
- Berries black; leaves leathery, usually much longer 2. S. laurifolia. than broad.
- 1. S. wälteri Pursh. Coral Greenbrier—Vine of pineland ponds and swamps, Coastal Plain over most of our territory.
- 2. S. laurifolia L. Bamboo-vine—Non-alluvial, acid swamps, Coastal Plain, Florida northward and westward to the limits of our territory.

# AMARYLLIDACEAE Amaryllis family

#### 1. Crinum L.

C. americanum L.—Extreme southern Coastal Plain, Florida westward along the Gulf to beyond the limits of our territory.

### 2. Hymenocallis L.

- Sepals and petals green; stalk terminated by a single 1. H. palmeri. flower.
- Sepals and petals white; stalk terminated by 2 to many 2. flowers.
  - 2. Stalk terminated by 8-16 flowers; crown small, 2. H. kimballiae. 2.5-3.5 cm. wide.
  - Stalk terminated by 2-8 flowers; crown at least 3.
     4 cm. wide.
- Filaments arising from a sinus, sometimes very shallow,
   between the lobes or angles of the crown; filaments
   not arising from a 2-pronged lobe.
- 3. Filaments arising from a 2-pronged lobe of the crown 3. H. laciniata. with a sinus intervening between filaments.
  - 4. Edge of crown between the filaments erose..... 4. H. crassifolia.
  - 4. Edge of crown between the filaments with 3, 5. H. tridentata. sometimes 5, teeth.
- 1. H. palmeri S. Wats. Alligator Lily—Found only in the Ever-glades region of Florida.

- 2. H. kimballiae Small—Known only from swamps around the estuary of the Apalachicola River in West Florida.
  - 3. H. laciniata Small-Known from swamps in North Florida.
- 4. H. crassifolia Herb.—Marshes on the Coastal Plain, northeast Florida to North Carolina.
- 5. H. tridentata Small—Known only from swamps along the east coast in Florida.

### IRIDACEAE Iris family

#### 1. Nemastylis Nutt.

N. floridana Small—Swamps and marshes, known only from the northeastern coastal region of Florida.

#### 2. Iris L.

	2. Iris L.		
1.	Flowers coppery red	1.	I. fulva.
ì.	Flowers violet, lilac, bluish, or white	2.	
	2. Petals present and well-developed, nearly as	3.	
	long as the sepals.		
	2. Petals present but almost rudimentary, much	2.	I. tripetala.
	exceeded by sepals.		
	Hypanthium 6-angled		
3.	Hypanthium 3-angled		
	4. Capsule sharply 6-angled, flowering stalk zig- zag.	5.	
	4. Capsule bluntly 6-angled, flowering stalks nearly straight.	6.	
5.	Style-appendages half-ovate; claw of sepal yellow-green without; foliage yellow-green.	3.	I. hexagona.
5.	Style-appendages lanceolate; claw of sepal deep-green without; foliage deep-green.	4.	I. rivularis.
	6. Flowers white, except the yellow crest	5.	I. albispiritus.
	6. Flowers colored		
7.	Capsule and hypanthium sharply 3-angled; rootstock		
	wiry, slender.		
7.	Capsule and hypanthium bluntly 3-angled; rootstock stout and fleshy.	8.	
	8. Petals shorter than the styles; sepals rough- ened at base of blade with minute bumps, and with a dull yellow spot; outermost bracts with margins darkened and somewhat var- nished; seeds regularly pitted and appearing as if varnished.	8.	I. versicolor.
	8. Petals longer than the styles; sepals hairy at the base of blade and with a bright yellow spot; outermost bracts green and softmargined; seeds irregularly or not at all pitted, dull.		I. virginica.

- 1. I. fulva Ker. Wild Iris—Most common in the western portion of our territory, but said to be found east as far as Georgia.
- 2. I. tripetala Walt. Wild Iris—Coastal Plain, North Florida to North Carolina, seeming to prefer acid situations.

- 3. I. hexagona Walt.—Coastal Plain, North Florida to South Carolina. Small has described I. alabamensis from marshes in west Central Alabama which is similar to this.
- 4. I. rivularis Small—Coastal Plain, Northeast Florida to the adjoining portion of Georgia.
- 5. I. albispiritus Small—White species, most common on savannas in the lower half of the Florida peninsula.
- 6. I. savannarum Small—Also an inhabitant of savannas of penin-sular Florida.
- 7. I. prismatica Pursh—Marshes and swamps, Coastal Plain, Georgia to the northern limits of our territory, often in acid situations.
- 8. I. versicolor L.—Marshes and swamps in our territory from Georgia west to Mississippi and north to the limit of our range.
- 9. I. virginica L.—Range similar to the preceding except also known from North Florida.

# HAEMODORACEAE Bloodwort family

### 1. Gyrotheca Salisb.

G. tinctoria (Walt.) Salisb. Paint-root—Acid situations, Coastal Plain, Florida north and west to the limits of our territory.

# CANNACEAE Canna family

#### 1. Canna L.

C. flaccida Salisb. Golden Canna—Infrequent plant of swamps and marshes, Coastal Plain, Florida to South Carolina.

# MARANTACEAE Arrowroot family

#### 1. Thalia L.

- Flowers closely crowded on the stalk; clusters of bracts. 1. T. dealbata. and bractlets ovoid.
- Flowers separated on the stalk; clusters of bracts and 2. T. geniculata. bractlets narrowly conic.
- 1. T. dealbata Roscoe—Infrequent in swamps and ponds, Coastal Plain, Florida to South Carolina and along the Gulf to the western limit of our territory.
- 2. T. geniculata L.—Largest-leaved aquatic herb; in fact, the largest-leaved of all native herbs. The plants stand 2 to 3.5 meters high. Its range is restricted to ponds, swamps, and marshes in Florida.

# ORCHIDACEAE Orchid family

#### 1. Habenaria Willd.

H. repens Nutt.—Acid swamps and ponds, Coastal Plain, Florida to North Carolina and westward.

# PIPERACEAE Pepper family

#### 1. Saururus L.

S. cernuus L. Lizards-tail—This emergent plant is well distributed over all of our area. Its habitat is very variable, but it is frequently found in truly aquatic areas. It shows a wide acidity tolerance and is found in acid and alkaline regions alike. It is very often found in association with Anopheles quadrimaculatus and in some instances constitutes a major problem.

# JUGLANDACEAE Walnut family

#### 1. Carya Nutt.

C. aquatica (Michx. f.) Nutt. Swamp Hickory—River-swamps and river-bottoms mostly in the Coastal Plain, Florida north and west to the limits of our territory.

# MYRICACEAE Bayberry family

# 1. Myrica L.

- Fruit 2-3 mm. in diameter; leaves long-attenuate to the 1. M. cerifera. base, acute at apex.
- 1. Fruit 3.5-4 mm. in diameter; leaves not long-attenuate 2. M. carolinensis. to base, apex obtuse.
- 1. M. cerifera L. Wax Myrtle—Occasionally in swamps but is more frequently in non-aquatic situations over all of our Coastal Plain territory.
- 2. M. carolinensis Mill. Bayberry—Acid swamps and other non-aquatic situations over most of our Coastal Plain territory.

# SALICACEAE Willow family

# 1. Salix [Tourn.] L.

- 1. Leaves closely and finely toothed\_\_\_\_\_\_2.
- 1. Leaves with remote teeth\_\_\_\_\_\_ 1. S. interior.
  - 2. Leaves green beneath \_\_\_\_\_ 2. S. nigra.
- 3. Twigs not brittle-jointed 4. S. longipes.
- 1. S. interior Rowlee. Sandbar Willow—Alluvial areas in the Mississippi Valley, aquatic mostly during periods of high water.

- 2. S. nigra Marsh. Black Willow—The common swamp willow over all of our territory. It is often found in situations also favored by Anopheles quadrimaculatus.
- 3. S. harbisonii Schneider—Swamps in our territory from North Carolina south to Florida. Apparently has been most frequently collected from along rivers. It has been suspected of being a hybrid between the preceding and following species.
- 4. S. lengipes Shuttlew.—Swamps and along streams mostly in the Coastal Plain. Its range embraces/all of our Coastal Plain territory. S. amphibia Small, described from lakes and swamps in peninsular Florida, should be referred to this species.

# BETULACEAE Birch family

### 1. Betula [Tourn.] L.

B. nigra L. River Birch—Swamps of streams over all of our range. Unmistakable because of its reddish, papery bark.

### 2. Alnus [Tourn.] L.

A. serrulata Willd. Alder—Swamps along branches, creeks and rivers in various provinces, range covers all of our territory. This species is commonly referred to as Alnus rugosa (Du Roi) Spreng.

# URTICACEAE Nettle family

# 1. Boehmeria Jacq.

- Leaf-blades leathery, finely toothed; petioles much 1. B. drummondiana. shorter than the blades.
- 1. Leaf-blades thin, coarsely toothed; petioles as long as  $\ 2.\ B.\ cylindrica.$  the blades or only slightly shorter.
- 1. B. drummondiana Wedd. Bog-hemp—Swamps in various provinces, range includes all of our territory.
- 2. B. cylindrica (L.) Willd.—Distribution in our territory about the same as the preceding, but apparently more common.

# ULMACEAE Elm family

### 1. Planera J. F. Gmel.

P. aquaica (Walt.) J. F. Gmel. Water Elm—Swamps along rivers, range covers most of our Coastal Plain and Mississippi Valley territory.

# POLYGONACEAE Buckwheat family

#### 1. Rumex L.

- 1. Leaf-blades short and broad, rounded or cordate at 1. R. fascicularis. base; sepal-wings toothed.
- Leaf-blades narrow and elongate, narrowed to the base;
   R. verticillatus.
   sepal wings undulate.

- 1. R. fascicularis Small—Around ponds and in prairies in peninsular Florida.
- 2. R. verticillatus L. Swamp-dock—Common mostly in swamps of rivers or creeks, various provinces over all of our territory. Larvae of Anopheles quadrimaculatus have been found associated with this plant.

2. Polygonum [Tourn.] L.

	Stems armed with prickles; leaves lobed at base	1. P. sagittatum.
1.	Stems not armed with prickles	2. P. coccineum.
	2. Clusters of flowers axillary as well as terminal, more than 2 and usually several.	3.
3.	Ocreae (sheaths on stem just above bases of leaves) not fringed with bristles.	4.
3.	Ocreae fringed with bristles	7.
	4. Flower clusters erect	
	4. Flower clusters nodding, slender	3. P. lapathifolium.
5.	Plant perennial; achene turgid-lenticular; flowers	
	usually white or whitish, with tiny dark dots when	•
	viewed with lens.	
5.	Plant annual; achene flat; flowers usually pink, not	6.
	dotted.	
	6. Style or stamens conspicuously longer than the perianth.	5. P. longistylum.
	6. Style or stamens hidden by the perianth	6. P. pensylvanicum.
7.	Perianth showing tiny dark dots when viewed with a	
_	lens.	
7.	Perianth not showing tiny dark dots when viewed with a lens.	9.
	8. Achene granular, dull; flower clusters often nodding.	7. P. hydropiper.
	8. Achene smooth, shining; flower clusters erect_	•
	Flower cluster short, stout, compact	
9.	Flower cluster slender, not dense	10.
	10. Leaves cordate or subcordate at base, sessile; stem and ocreae hairy.	10. P. hirsutum.
	10. Leaves narrowed to a petiole at base; stem and ocreae not hairy.	11.
11.	Leaves tapering to both ends from a point well below the middle covered with stiff hairs.	11. P. setaceum.
11.	Leaves with nearly parallel sides usually not hairy	12.
	12. Spike loose; the white or pink perianth completely hiding the mature nutlet.	
	12. Spike more dense; the green perianth not	13. P. opelousanum.

1. P. sagittatum L. Rakestraw—Moist places over all of our territory.

hiding the tip of the mature achene.

2. P. coccineum Muhl.—Occurs widely in our territory, but infrequent. Seems to prefer alluvial situations. This and the following 11 species are listed under the genus Persicaria by Small.

- 3. P. lapathifolium L.—Most common in alluvial marshes and swamps along rivers, range covering all of our territory. It has on occasion been found in association with Anopheles quadrimaculatus.
- 4. P. densiflorum Meisn.—Range includes all of our Coastal Plain. Said to be found in swamps, ponds, and along lake-borders.
- 5. P. longistylum Small—Should be expected only in the extreme western part of our territory.
- 6. P. pensylvanicum L. Smartweed—Distributed over all of our territory, both in aquatic and non-aquatic situations. Most common, perhaps, in alluvial marshes and Anopheles quadrimaculatus has been found associated with it occasionally.
- 7. P. hydropiper L. Water-pepper—Ranges over all of our territory, often not truly aquatic. When found in water, generally prefers neutral or alkaline conditions.
- 8. P. punctatum Ell.—Shows a wide acidity tolerance and, like many of this genus, is equally at home in the water and on land. Range covers all of our territory, and breeding of Anopheles quadrimaculatus has occasionally been found associated with it.
- 9. P. persicaria L.—Most often found on land, occasionally truly aquatic. Range includes all of our territory.
- 10. P. hirsulum Walt.—Coastal Plain, Florida and Georgia. Collected from acid limesink ponds and other very acid situations.
- 11. P. setaceum Baldw.—This Water-pepper is found over all of our Coastal Plain. The writers have encountered it most frequently in acid situations.
- 12. P. hydropiperoides Michx.—Various provinces over all of our territory. Anopheles quadrimaculatus found associated with it at Reelfoot Lake, Tennessee.
- 13. P. opelousanum Ridd.—Various provinces over all of our territory. The writers have not often noted it owing to its similarity to the preceding species.

# AMARANTHACEAE Amaranth family

#### 1. Acnida L

A. cuspidata Bertero—Huge herb, the largest in our flora, found in marshes and swamps, Coastal Plain, Florida to Louisiana. The stem at the base of the plant sometimes reaches over a foot in diameter.

### 2. Alternanthera Forsk.

A. philozeroides (Mart.) Griseb. Alligator-grass—Pestiferous species, naturalized from South America and often found in alluvial areas. Found in a variety of aquatic areas, Coastal Plain, Florida to North Carolina and westward. In the Tennessee Valley it has become introduced and very often harbors larvae of Anopheles quadrimaculatus. This species is listed by Small under the genus Achyranthes.

# CERATOPHYLLACEAE Hornwort family

#### 1. Ceratophyllum L.

- 1. Achene armed on the edges with spines, long-beaked\_\_ 1. C. demersum. 1. Achene unarmed, short-beaked\_\_\_\_\_\_\_ 2. C. submersum,
- 1. C. demersum L. Coontail-moss—Various provinces, over all of our territory. Most often found in neutral or alkaline waters, although tolerating some degree of acidity. Anopheles quadrimaculatus has been found associated with it. Variety echinatum A. Gray is sometimes given specific rank.
- 2. C. submersum L.—Found only in ponds on the southern part of the peninsula of Florida.

# NYMPHAEACEAE Water-lily family

### 1. Nuphar Sibth.

- 1. Leaf-blades more than twice as long as wide, the sinus 2. less than one-fourth the length of the blade. 1. Leaf-blades less than twice as long as wide, the sinus 3. one-fourth to one-half the length of the blade. 2. Leaf-blades over 3 times as long as wide, the 1. N. sagittaefolia. sinus open. 2. Leaf-blades less than 3 times as long as wide, 2. N. ulvacea. the sinus closed. 3. Leaves pubescent beneath\_\_\_\_\_4. 3. Leaves glabrous beneath\_\_\_\_\_\_5. 4. Leaf-blade with a closed sinus; stamens in 9-10 3. N. orbiculata. rows; flowers about 5 cm. in diameter; seed 4 mm. long. 4. Leaf-blade with an open sinus; stamens in 6-7 4. N. bombycina. rows; flowers about 7 cm. in diameter; seed 6 mm. long. 5. Leaf-blades of an orbicular or ovate-orbicular type\_\_\_\_ 5. N. fluviatile.
- 5. Leaf-blades manifestly longer than wide\_\_\_\_\_6.
  - 6. Leaf-blades very thin; submersed leaves present\_ 6. N. chartacea.
  - 6. Leaf-blades thick; submersed leaves absent\_\_\_\_ 7. N. advena.
- 1. N. sagittaefolium (Walt.) Pursh. Cow-lily-Sluggish streams, Coastal North and South Carolina and Virginia. This and the following six species are all listed by Small under Nymphaea.
- 2. N. ulvaceum (Miller & Standley) Standley-Sluggish streams in West Florida. Possibly this is what has been recorded as N. sagittaefolium from Alabama.
- 3. N. orbiculatum (Small) Standley-Lakes and ponds from Middle Florida to Southernmost Georgia.
- 4. N. bombycinum (Miller & Standley) Standley-Ponds in the Coastal Plain, North Florida and adjacent Georgia. The senior author has collected it from acid limesinks in South Georgia, near the South Carolina line.

- 5. N. fluviatile (Harper) Standley—Coastal Plain, West Florida to Alabama and North Carolina. Usually occurs in connection with streams or rivers, but may be found in perfectly still water.
- 6. N. chartaceum (Miller & Standley) Standley—Ponds near the Gulf from Florida to Mississippi.
- 7. N. advena Ait. Cow-lily—Most widely distributed and most frequent species of the genus. Range covers all of our States and is often found in alluvial situations. Nymphaea macrophylla Small is included in this consideration of N. advena.

### 2. Nymphaea L.

1. Flowers white	1.	N. odorata.
1. Flowers blue or yellow	2.	
2. Flowers blue	2.	N. elegans.
2. Flowers yellow	3.	N. flava.

- 1. N. odorata Ait. White Water-lily—Distributed over all of our territory and very frequent. Shows an extremely wide acidity tolerance, being found in the most acid and the most alkaline waters alike. This and the two following species are listed under Castalia by Small's Manual.
- 2. N. elegans Hook. Blue Water-lily—Big Cypress Swamp, Florida, but may be introduced at other points.
- 3. N. flava Leitner. Yellow Water-lily—Known only from lakes, ponds, and slow streams on the peninsula of Florida.

### 3. Cabomba Aubl.

C. caroliniana A. Gray. Fanwort—Mat-forming species, distributed over most of our territory, but not frequent in most portions. Perhaps most often found in alluvial aquatic areas.

#### 4. Brasenia Schreb.

B. schreberi Gmel. Water-shield—Well distributed in a variety of aquatic situations, its range covering all of our territory. Collected from alluvial marshes and swamps, as well as from very acid limesink ponds. Some investigators have found a negative correlation with Anopheles quadrimaculatus.

#### 5. Nelumbo Adams.

N. lutea (Willd.) Pers. Lotus, Water-chinquapin—Well distributed over the Coastal Plain, collected or noted in a variety of situations by the writers. Grows in acid limesinks, alluvial marshes, and other aquatic areas where it is not indigenous (for instance, borrow pits and artesian impoundments). In the Tennessee Valley it is often found

in association with Anopheles quadrimaculatus. The pink-flowered N. nucifera Gaertn. has been noted as introduced in two localities in Georgia.

# RANUNCULACEAE Crowfoot family

### 1. Caltha [Rupp.] L.

C. palustris L. Marsh-marigold—May possibly come into our territory in its northern part. Prefers calcareous situations.

#### 2. Myosurus L.

M. minimus L. Mouse-tail—Marginş of aquatic areas, various provinces, its range covering all of our territory. Apparently prefers calcareous soils.

### 3. Ranunculus [Tourn.] L.

- Leaves cut into many thread-like or ribbon-like divisions.
- Leaves entire or lobed but not cut into divisions as 2. above.
  - 2. Leaves narrow, nearly linear, not lobed\_\_\_\_\_\_ 3.
  - 2. Leaves broad, deeply lobed\_\_\_\_\_\_ 2. R. sceleratus.
- 3. Plants perennial; stems creeping; achene with a subu- 3. R. ambigens. late beak.
- 3. Plants annual; stems not creeping; achene beakless\_\_\_ 4.
  - 4. Petals mostly over 3 mm, long\_\_\_\_\_ 4. R. laxicaulis.
  - 4. Petals mostly less than 3 mm. long\_\_\_\_\_ 5.
- 5. Achene papillose\_\_\_\_\_ 5. R. lindheimeri.
- 5. Achene smooth \_\_\_\_\_ 6. R. pusillus.
- 1. R. flabellaris Raf. Water Buttercup—In our territory only along the Mississippi River Valley in Tennessee and North Mississippi unless possibly in North Carolina. This is the R. delphinifolius Torr. of Small's Manual.
- 2. R. sceleratus L.—Introduced species, its range including all of our territory. The senior author has noted it only in alluvial situations in the Mississippi River Valley.
- 3. R. ambigens S. Wats.—Should be expected only in the northern part of our territory. Listed as R. obtusiusculus Raf. by Small.
- 4. R. laxicaulis (T. & G.) Darby—Moist places in the Coastal Plain and occasionally other provinces, its range including all of our territory.
- 5. R. lindheimeri Engelm.—Ponds from Alabama westward to beyond our limits.
  - 6. R. pusillus Poir.—Wet places over all of our territory.

# MAGNOLIACEAE Magnolia family

#### 1. Magnolia L.

M. virginiana L.—This tree (sometimes shrub) is found over all of our Coastal Plain and seems to prefer acid soils.

# CRUCIFERAE Mustard family

#### 1. Rorippa Scop.

R. sessiliflora (Nutt.) Hitchc. Water-cress—Various provinces, Florida north and west to beyond the limits of our territory. The senior writer has collected it from ponds in the Mississippi Valley in Tennessee and Mississippi. This species is listed under Radicula by Small.

#### 2. Neobeckia Greene

N. aquatica (A. Eaton) Britton. Lake-cress—Said to range over most of our territory but noted by the writers only in the western portion.

#### 3. Nasturtium R. Brown

N. officinale R. Brown. Water-cress—Very variable species, ranging over all of our territory from Georgia north and west, particularly in springy places. This species is called Sisymbrium Nasturtium-Aquaticum L. by Small.

# CRASSULACEAE Orpine family

# 1. Penthorum [Gronov.] L.

P. sedoides L. Ditch Stonecrop—Swamps and ponds usually in association with streams, over all of our territory.

# ITEACEAE Virginia willow family

# 1. Itea [Gronov.] L.

I. virginica L. Virginia Willow—Ranges over most of our Coastal Plain and is occasionally found in the Piedmont, most often in association with creeks or small streams.

# ROSACEAE Rose family

### 1. Rosa [Tourn.] L.

R. palustris Marsh. Swamp Rose—Swamps and ponds over almost all of our territory.

# MALACEAE Apple family

#### 1. Crataegus L.

C. aestivalis (Walt.) T. & G. Mayhaw—Ponds and perhaps along streams, Florida to South Carolina and westward beyond the limits of our region. In Southwest Georgia it is the dominant species in temporary ponds of solution origin.

# LEGUMINOSAE Pea family

#### 1. Gleditsia L.

6. aquatica Marsh. Swamp Locust—River-swamps, Florida to South Carolina and westward in the Coastal Plain. Very common in the valley of the Mississippi River. May easily be distinguished from the similar G. tricanthos L. by the oval, single-seeded pod.

#### 2. Amorpha L.

A. fruticosa L. Indigo-bush—Common in swamps in non-acid regions, ranging over all of our territory. A glabrous species, A. nitens F. E. Boynton, has been described from swamps near Waynesboro, Georgia, and a few of the other species of Amorpha may occasionally grow in wet places.

# POLYGALACEAE Milkwort family

### 1. Polygala L.

1.	Flower clusters compound; that is, made up of several clusters	2.		
1.	Flowers in a single terminal cluster	4.		
	2. Flowers yellow	3.		
	2. Flowers white			baldwini.
3.	Capsule round, seed about 0.5 mm. long	2.	Р.	ramosa.
3.	Capsule 2-lobed, seed about 1 mm. long	3.	<i>P</i> .	cymosa.
	4. Flowers brilliant orange	4.	<i>P</i> .	lutea.
	4. Flowers lemon-yellow	5.	<i>P</i> .	rugelii.

- 1. P. baldwini Nutt.—Low pinelands and acid pineland swamps, Coastal Plain, Florida to Georgia and Mississippi. This and the four following species are listed under the genus Pilostaxis by Small.
- 2. P. ramosa Ell.—Situations similar to the above, but more wide-spread, ranging north and west in the Coastal Plain to beyond the limits of our territory.
- 3. P. cymosa Walt.—More truly aquatic than the preceding two or the following species. Found in acid cypress ponds and pineland pools over all of our Coastal Plain territory.
- 4. P. lutea L.—Acid moist places, Coastal Plain, Florida north and west to beyond the limits of our territory.
- 5. P. rugelii Shuttlw.—Pineland swamps and ponds only in peninsular Florida.

# EUPHORBIACEAE Spurge family

### 1. Stillingia Garden

S. aquatica Chapm.—Low, short-lived shrub with extremely light corky wood. Found infrequently in acid ponds and marshes, Coastal Plain, Florida to South Carolina and Mississippi.

# CALLITRICHACEAE Water Starwort family

#### 1. Callitriche L.

- 1. Fruit longer than broad, lobes keeled\_\_\_\_\_\_ 1. C. palustris.
- 1. Fruit as broad as long, lobes rounded on edges\_\_\_\_\_ 2. C. heterophylla.
- 1. C. palustris L. Water Starwort—In ponds over all of our territory.
- 2. C. heterophylla Pursh. Water Starwort—Should also range over all of our territory.

# CYRILLACEAE Titi family

#### 1. Cyrilla Garden

- 1. Leaves mostly over 5 cm. long; petals 3 mm. long or 1. C. racemiflora. more.
- 1. Leaves mostly less than 4 cm. long; petals less than 2. C. parvifolia. 3 mm. long.
- 1. C. racemistora L. Titi—Acid swamps over all of our Coastal Plain territory.
- 2. C. parvifolia Raf. Titi—Small-leafed species, found from North Florida westward along the Gulf to beyond our limit.

#### 2. Cliftonia Gaertn.

C. monophylla (Lam.) Sarg. Titi—Non-alluvial acid swamps in the Coastal Plain, North Florida to Georgia and westward to beyond the limit of our range.

# AQUIFOLIACEAE Holly family

#### 1. Ilex L.

- 1. Berry black
   1. I. coriacea.

   1. Berry red
   2.

   2. Leaf-blades linear, 1-4 cm. long
   2. I. myrtifolia.

   2. Leaf-blades elliptic, 4-10 cm. long
   3. I. cassine.
- 1. I. coriacea (Pursh) Chapm.—Acid non-alluvial swamps, Coastal Plain, Florida north and west to beyond the limits of our territory.
- 2. I. myrtifolia Walt.—Acid swamps and acid Cypress ponds, Coastal Plain, Florida to North Carolina and to the westward beyond the limit of our territory.
- 3. I. cassine L. Yaupon—Swamps, usually acid, Coastal Plain, Florida north and west to beyond the limits of our region.

# ACERACEAE Maple family

#### 1. Acer L.

-1.	Leaves simple	2.		
	Leaves compound			
	2. Leaf-blades glabrous or nearly so beneath	2.	. A. rubrum.	
	2. Leaf-blades wooly beneath	3.	. A. drummondii	

- 1. A. negundo L. Ash-leaved Maple—River-swamps over all of
- our territory. This species is listed under the genus Negundo by Small.
- 2. A. rubrum L. Red Maple—Creek and river-swamps over all of our territory. It and the following species are cited under the generic name of Rufacer by Small.
- 3. A. drummondii Hook. & Arn. Red Maple—Perhaps most common in the Mississippi Valley region but also occurring in riverswamps from Florida to Georgia and westward. Sometimes considered as only a variety of the preceding.

# RHAMNACEAE Buckthorn family

#### 1. Berchemia Neck.

B. scandens (Hill) Trelease. Rattan-vine—Swamps of creeks and rivers, mostly Coastal Plain, Florida north and west beyond the limits of our range.

# VITACEAE Grape family

### 1. Ampelopsis Michx.

A. arborea (L.) Rusby. Pepper-vine—Swamps of the larger rivers over all of our Coastal Plain and Mississippi Valley territory.

# MALVACEAE Mallow family

### 1. Hibiscus L. 1. Flowers brilliant red\_\_\_\_\_\_2. 1. Flowers pink or white \_\_\_\_\_ 3. 2. Leaf-blades with 5-7 narrow elongate lobes\_\_\_\_ 1. H. coccineus. 2. Leaf-blades merely toothed or with 3-5 promi- 2. H. semilobatus. nent but short, broad lobes. 3. Leaf-blades glabrous\_\_\_\_\_ 3. Leaf-blades pubescent at least beneath\_\_\_\_\_ 4. 4. Capsule glabrous\_\_\_\_\_ 4. H. moscheutos. 4. Capsule pubescent\_\_\_\_\_\_5. 5. Capsule beaked 6. 5. Capsule rounded or truncate at top\_\_\_\_\_ 5. H. lasiocarpus. 6. Leaf-blades lanceolate to ovate; toothed but 6. H. incanus. not lobed. 6. Leaf-blades as broad as long, 3-5 lobed\_\_\_\_\_ 7. H. grandiflorus. 1. H. coccineus Walt.—Swamps along the coast in Georgia,

Florida, and Alabama.

- 2. H. semilobatus Chapm.—Swamps, near the coast, East Florida.
- 3. H. militaris Cav. Rose Mallow—Alluvial swamps over all of our territory.
- 4. H. moscheutos L.—Marshes over all of our territory, especially in alluvial areas.
- 5. H. lasiocarpus Cav.—Swamps, various provinces, Georgia west to beyond the limits of our territory.
- 6. H. incanus Wendl.—Swamps, Coastal Plain, Florida and Alabama north to beyond the limits of our territory.
- 7. H. grandiflorus Michx.—Marshes, Coastal Plain, Florida to Georgia and Mississippi.

# HYPERICACEAE St. John's-wort family

### 1. Hypericum L.

1.	Petals	of flowers pink	2.	
1.	Petals	of flowers yellow	3.	
	2.	Filaments united only near the base; leaves sessile and clasping.	1.	H. virginicum.
	2.	Filaments united to near the middle; leaves sessile and clasping or narrowed and petioled.	2.	H. tubulosum.
3.	Plants	with prominent stolons	3.	H. adpressum.
3.	Plants	without prominent stolons	4.	
	4.	Inflorescence without leaves	4.	H. cistifolium.
	4.	Inflorescence leafy	5.	
5.	Leaves	clasping at base, ovate to ovate-lanceolate	5.	H. myrtifolium.
5.	Leaves	not clasping but narrowed at base	6.	
	6.	Leaves conspicuously whorled; leaves very narrow, sometimes needle-like and not revolute.	6.	H. galioides.
	6.	Leaves not conspicuously whorled; leaves usually not needle-like and revolute.	7.	H. densiflorum.

- 1. H. virginicum L.—Usually in acid swamps, ranging over most of our territory.
- 2. H. tubulosum Walt.—Consists, in our territory, of two varieties, the typical one and variety walteri (Gmel.) Lott. The former has broad based leaves while in the latter the leaves are narrowed to petioles. Both seem to be well distributed over the Coastal Plain in our territory. This and the preceding species are listed under the genus Triadenum by Small.
- 3. H. adpressum Bart.—Various provinces, Georgia north and west to beyond the limits of our territory.
- 4. H. cistifolium Lam.—Sometimes found at the margins of acid swamps and ponds, Coastal Plain, Florida north to South Carolina and west to beyond the limits of our territory. This is given as H. opacum T. & G. by Small.
- 5. H. myrtifolium Lam. St. John's-wort—Acid ponds, Coastal Plain, Florida north to South Carolina and west to Mississippi.

- 6. H. galioides Lam.—Very common in acid ponds ranging over most of our Coastal Plain territory. Some observers have noted that there is rarely an association of Anopheles quadrimaculatus with this plant. This species includes H. fasciculatum Lam. of Small's Manual.
- 7. H. densifierum Pursh—Sometimes difficult to distinguish from the preceding and like it found in acid situations. Its range includes most of our area.

# THEACEAE Camellia family

#### 1. Gordonia Ellis.

G. lasianthus (L.) Ellis. Red Bay—Non-alluvial acid swamps and bays, Coastal Plain, Florida north to North Carolina and west to the limit of our territory.

# LAURACEAE Laurel family

#### 1. Persea Gaertn.

P. pubescens (Pursh) Sarg. Sweet Bay—Non-alluvial swamps, Coastal Plain, Florida north and west to the limits of our territory. It is listed under the genus *Tamala* by Small.

#### 2. Glabraria L.

G. geniculata (Walt.) Britton—Rare plant, found around ponds, mostly in acid situations, Coastal Plain, Florida to and beyond the limits of our territory.

3. Benzoin Fabr.

- 1. Leaves tapering to the base; petioles slender and long\_\_\_ 1. B. aestivale.
- 1. Leaves rounded or cordate at the base; petioles stout 2. B. melissaefolium. and rather short.
- 1. B. aestivale (L). Nees. Spice-bush—Wet woods and swamps, various provinces over all of our territory.
- 2. B. melissaefolium (Walt.) Nees—Uncommon in swamps and pond margins over all of our Coastal Plain territory.

# MELASTOMACEAE Meadow Beauty family

#### 1. Rhexia L.

- Neck of the mature calyx tube as long as the body or 2. longer.
- Neck of the mature calyx tube much shorter than the 3. body.
  - 2. Leaf-blades narrowly linear\_\_\_\_\_\_ 1. R. cubensis.
- 2. Leaf-blades elliptic or lanceolate 2. R. mariana.
  3. Stems and branches round or nearly so 3. R. lanceolata.
- 3. Stems and branches sharply angled or 4-winged\_\_\_\_\_ 4.
  - 4. Flowers over 2 cm. across, colored\_\_\_\_\_\_5.
  - 4. Flowers less than 2 cm. across, white\_\_\_\_\_ 6. R. parviflora.
- 5. Lobes of calyx longer than neck of calyx tube; leaves 5. R. aristosa. entire or nearly so.

- Sepals shorter than neck of calyx tube or about as long;
   leaves toothed.
  - 6. Plant tuberous rooted 6. R. virginica.
  - 6. Plant not tuberous rooted \_\_\_\_\_ 7. R. stricta.
- 1. R. cubensis Griseb.—Swamps, Coastal Plain, Florida to Georgia and Mississippi.
- 2. R. mariana L. Meadow Beauty—Various situations over all of our range. As treated here it includes R. nashii Small.
- 3. R. lanceolata Walt.—Small species occurring in the Coastal Plain, Florida north and west to the limits of our territory.
- 4. R. parviflora Chapm.—Known to occur only in shallow ponds near Apalachicola, Florida, although the senior writer collected specimens which might be referred to this species from a limesink in Southwest Georgia.
- 5. R. aristosa Britton—Pineland swamps, Coastal Plain, Georgia north to beyond the limit of our range.
  - 6. R. virginica L.—Wet situations over all of our range.
- 7. R. stricta Pursh—Coastal Plain species, supposed to range from Georgia to North Carolina and Mississippi.

# LYTHRACEAE Loosestrife family

### 1. Didiplis Raf.

D. diandra (Nutt.) Wood. Water Purslane—Infrequent but range includes all of our area.

#### 2. Ammannia L.

- 1. Petals present
   2.

   1. Petals wanting
   1. A. latitolia.

   2. Style long and slender
   2. A. coccinea.
  - 2. Style very short and stout\_\_\_\_\_\_ 3. A. teres.
- 1. A. latifolia L.—Limesinks and swamps, South Florida and the Florida Keys.
- 2. A. coccinea Rottb.—Range includes all of our territory, but most frequent in non-acid regions.
- 3. A. teres Raf.—Florida north to beyond the limit of our region. Supposed to differ from A. latifolia only in having a corolla. The senior writer has seen it only near the coast.

#### 3. Rotala L.

R. ramosior (L.) Koehne—Ranges over all our territory, seeming to prefer non-acid situations.

#### 4. Decodon J. F. Gmel.

D. verticillatus (L.) Ell. Water Willow—Fairly frequent over all of our territory. Shows an extremely wide range of acidity tolerance as it is found in the very acid Okefinokee Swamp and the neutral Reelfoot Lake alike.

### 5. Lythrum L.

1. Stem creeping; leaves mostly opposite	1.	. L. flagellare.	
1. Stem erect; leaves mostly alternate	2.		
2. Leaf-blades rounded or cordate at base	2.	. L. alatum.	
2. Leaf-blades narrowed at the base	3.		
3. Leaf-blades thick, numerous, and less than 1.5 cm. long on branches.	g 3.	. L. lanceolatun	n.
3. Leaf-blades thin, few, and over 1.5 cm. long on branches	es_ 4.	. L. curtissii.	

- - 1. L. flagellare Shuttlw.—Swamps in lower peninsular Florida.
- 2. L. alatum Pursh-Swamps in various provinces over all of our territory except perhaps Florida.
- 3. L. lanceolatum Ell.-Coastal Plain, Florida north to South Carolina and west to beyond the limit of our area, mostly in alluvial situations.
- 4. L. curtissii Fernald-Known only from muddy and often calcareous swamps, North Florida and the immediately adjacent portion of South Georgia.

	ONAGRACEAE Evening primrose family				
	1. Ludwigia L				
1.	Leaves opposite	2.			
	Leaves alternate				
	2. Flowers sessile; corolla inconspicuous	3.			
	2. Flowers with long stalks; corolla conspic-	1. L. arcuata.			
	uous.				
3.	Calyx tube usually bearing one or more long bracts	2. L. natans.			
	above base; calyx tube without 4 longitudinal green				
	bands.				
3.	Bract, when present, borne basally; calyx tube with	3. L. palustris.			
	4 longitudinal green bands.				
	4. Flowers showy, stalked				
_	4. Flowers mostly not showy, sessile				
	Petals wanting or minute				
5.	Petals as long as the sepals or longer, showy				
	6. Capsule 1-3 mm. long, plants sometimes de-	<i>(.</i>			
	pressed.	0			
7	6. Capsule 3-8 mm. long, plants erectPlant depressed; leaves entire	5. I microscorna			
	Plant ascending; leaves toothed near the apex				
"	8. Capsule about as thick as long, not cylindric.				
	8. Capsule much longer than thick, cylindric				
9.	Foliage and fruit copiously pubescent	-			
	Foliage and fruit glabrous or nearly so	•			
•	10. Inflorescence terminal				
	10. Flowers distributed over plant	_			
11.	Capsules turbinate or obpyramidal but not globular				
	Capsule globular				
	12. Capsule with the angles rounded or merely	13.			
	square.				
	12. Capsule with the angles winged or at least	14.			

margined.

- Capsule glabrous, the angles rounded; with two bracts 11. L. polycarpa. adnate to the calyx tube near base.
- 13. Capsule puberulent, the angles square; bracts not 12. L. simulata. adnate to the calyx tube.
  - Sepals not quite as broad as long, almost as 13. L. alata. long as the capsule.
  - 14. Sepals broader than long, only about one-half 14. L. lanceolata. as long as the capsule.
- 15. Capsule round, cylindric\_\_\_\_\_ 15. L. linifolia.
- 15. Capsule narrowly obpyramidal, tapered from base to  $\,$  16.  $L.\ linearis.$  apex.
- 1. L. arcuata Walt.—This species is cited by Small as Ludwigiantha arcuata (Walt.) Small. Occurs in marshes and ponds, Coastal Plain, Florida to Virginia, often in very acid situations.
- 2. L. natans Ell.—This species exists in our territory in two varieties and includes both Isnardia repens and Isnardia intermedia of Small. It is a Coastal Plain species and is found from Florida north and west to the limits of our territory.
- 3. L. palustris (L.) Ell.—Also present in our territory in two varieties. More widespread than the preceding and not limited to the Coastal Plain. Range includes all of our territory. It is found over a wide range of acidity. Anopheles quadrimaculatus is often found associated with it. This plant is given under the genus Isnardia in Small. A related species of Ludwigia, L. spathulata T. & G., which is a hairy species with the capsule turgid and constricted at the top, is found in ponds in Middle Florida.
  - 4. L. alternifolia L.-Low places over all of our territory.
- 5. L. microcarpa Michx.—Coastal Plain, Florida to North Carolina and Mississippi, seeming to prefer non-acid conditions.
- 6. L. curtissii Chapm.—Related to the preceding, but found only on the peninsula of Florida.
- 7. L. glandulosa Walt.—Coastal Plain and occasionally in other provinces, most frequently in alluvial areas along rivers. Range includes all of our territory.
- 8. L. pilosa Walt.—Hairy species, most often found in acid ponds and bays, Coastal Plain, Florida to North Carolina and beyond our limit in Louisiana.
- 9. L. suffruticosa Walt.—Margins of acid ponds, Coastal Plain, Florida to North Carolina.
- 10. L. sphaerocarpa Ell.—Frequent species over all of our Coastal Plain. Commonly observed by the senior author in acid, open limesinks in Georgia.
- 11. L. polycarpa Short & Peter—Not observed in our territory by the writers, but said to be present in Tennessee. Has been seen in aquatic areas along the Mississippi not far north of our areas.

- 12. L. simulata Small—Coastal Plain swamps, Florida to North Carolina.
- 13. L. alata Ell.—Coastal Plain, Florida north and west to and beyond the limits of our territory.
- 14. L. lanceolata Ell.—Coastal Plain aquatic areas, Florida to North Carolina.
- 15. L. linifolia Poir.—Acid pineland swamps, Coastal Plain, Florida to North Carolina and Mississippi.
- 16. L. linearis Walt.—Acid places, Coastal Plain, Florida north and west to beyond the limits of our territory.

#### 2. Jussiaea L.

- 1. Plants creeping or floating 2. 1. Plants erect\_\_\_\_\_\_\_3. 2. Leaf-blades long-petioled; flowers 2-3 cm. 1. J. diffusa. 2. Leaf-blades short-petioled; flowers 3-4 cm. 2. J. grandiflora. across. 3. Capsule long, narrowly cylindric, more than 3 cm. long\_ 4. 3. Capsule shorter, obconic or nearly cylindric, less than 6. 2 cm. long.
  - 4. Calvx of 5 sepals 3. J. leptocarpa. 4. Calyx of 4 sepals \_\_\_\_\_ 5,

- 5. Leaf-blades broad 5. J. scabra.
  - 6. Fruit winged; leaf-blades sessile and decurrent 6. J. decurrens.
    - 6. Fruit not winged; leaf-blades short petioled\_\_\_\_ 7. J. peruviana.
- 1. J. diffusa Forsk.—Florida westward, mostly in the Coastal Plain, to beyond our limits. Not common in the eastern part of our territory.
- 2. J. grandiflora Michx.—Ranges over all of our Coastal Plain, and is established in some localities northward. Most often found in aquatic areas associated with streams, and often grows well in impoundments. It and the preceding have been found in association with Anopheles quadrimaculatus.
- 3. J. leptocarpa Nutt.—Partial to acid places, Coastal Plain, Florida to Georgia and westward to beyond the limits of our territory.
- 4. J. angustifolia Lam.—Southernmost part of our territory, Florida to beyond our western limit, in swamps.
  - 5. J. scabra Willd.—Wet places in Florida.
- 6. J. decurrens (Walt.) DC.—Ranges over all of our area in low grounds, most frequent in the Coastal Plain. Often found in weedy habitats.
  - 7. J. peruviana L.—Everglades and in swamps, peninsular Florida.

# HALORAGIDACEAE Water milfoil family

#### 1. Proserpinaca L.

- 1. Leaves all nearly alike and all deeply lobed or divided\_\_ 2.
- 1. Upper leaves (those bearing flowers in axils) toothed 1. P. palustris. but not lobed or divided.
  - 2. Rachis of leaves about as broad as the segments\_ 2. P. pectinata.
  - 2. Rachis of leaves much broader than the seg- 3. P. intermedia. ments or lobes.
- 1. P. palustris L. Mermaid Weed—This species is found in our region in several varieties, and it includes not only P. palustris but also P. amblygona and P. platycarpa of Small's Manual. The range of the species covers all of our territory, and it is often found in acid situations but shows some tolerance.
- 2. P. pectinata Lam.—Ranges over all of our area, but most common in the Coastal Plain. Found in the same type places as the preceding species.
- 3. P. intermedia Mackenzie—Possibly a hybrid between the two preceding. Rare but known from Georgia north to beyond the limit of our territory.

### 2. Myriophyllum L.

- 1. Emersed leaves nearly like submerged leaves \_\_\_\_\_ 1. M. brasiliense.
- Emersed leaves definitely different from submerged 2. leaves.
  - 2. Stamens 4; corolla persistent............................. 3.
  - 2. Stamens 8; corolla deciduous\_\_\_\_\_\_ 2. M. laxum.
- 1. M. brasiliense Cambess. Parrot's-feather—Tropical species, introduced in the Coastal Plain, Florida to Georgia and westward beyond the limits of our territory. It is often found in association with Anopheles quadrimaculatus and seems to prefer neutral or alkaline
- 2. M. laxum Shuttlw.—Rare species, found only in ponds and lakes in North Florida, South Georgia and South Alabama. The senior writer has collected it from acid, open limesinks in Southwest Georgia.

waters. This species is listed under M. proserpinacoides Gill by Small.

- 3. M. heterophyllum Michx.—Ranges over all of our territory, but most common in the Coastal Plain. Seems to prefer less acid waters than the following. Anopheles quadrimaculatus is often found associated with it.
- 4. M. pinnatum (Walt.) B. S. P.—Should range over all of our territory. It is the impression of the writers that this species is found in more acid waters than the preceding, but owing to the difficulty of identifying the Myriophyllum group in the field this impression may be erroneous. It is most common in the Coastal Plain.

# CORNACEAE Dogwood family

#### 1. Nyssa L.

- Fruits solitary, large (3-4 cm. long); stone winged or 2. sharply ridged.
- Fruits 2 or more together, small (1-1.5 cm. long); stone 1. N. sylvatica. not winged or sharply ridged.

2. Fruit purple or blue, stone only sharp-ridged; 2. N. aquatica. large straight tree with swollen base.

2. Fruit red, stone winged; small crooked tree\_\_\_\_ 3. N. ogeche.

- 1. N. sylvatica Marsh. Black-gum—Present in our region in no less than four varieties but variety biflora (Walt.) Sarg. is the most characteristically aquatic. Ranges in the Coastal Plain (and occasionally in upland provinces) over most of our territory and, in acid regions at least, is very common. N. ursina Small is a copiously branched shrubby species with a globular drupe which is known only from pineland swamps in the Apalachicola River delta in Florida. Our common aquatic Black-gum is listed as N. biflora Walt. by Small.
- 2. N. aquatica L. Tupelo-gum—Ranges over all of our Coastal Plain territory, being seen most often in alluvial situations.
- 3. N. ogeche Marsh. Ogeche Lime—Acid situations from around Apalachicola in Florida to extreme southern South Carolina. It has a shrubby variety, var. acuminata (Small) Eyles, in pineland swamps near the coast in Georgia.

# UMBELLIFERAE Carrot family

# 1. Eryngium [Tourn.] L.

E. aquaticum L. Snakeroot—Moist places along the coast from Florida north.

# 2. Hydrocotyle [Tourn.] L.

- 1. Leaves peltate
   2.

   1. .Leaves not peltate
   3.

   2. Fruit notched at the base and the apex
   1. H. umbellata.

   2. Fruit not notched
   2. H. verticillata.

   3. Leaves shallowly lobed; flower clusters almost without stalks.
   3. H. americana.
- 3. Leaves deeply lobed; flower clusters with long stalks\_\_\_ 4. H: ranunculoides.
- 1. H. umbellata L. Water Pennywort—Common aquatic species and occurs over all of our area, especially in the Coastal Plain. Found in a wide variety of conditions.
- 2. H. verticillata Thunb.—Should also be found over all of our area but not as commonly as the preceding. Most common in the Coastal Plain.

- 3. H. americana L.—Present in our area in North Carolina and Tennessee.
- 4. H. ranunculoides L. f.—Range includes all of our area. The senior writer has observed it in alkaline waters near the coast.

#### 3. Centella L.

C. erecta (L. f.) Fernald—Shallow ponds and low places, Coastal Plain, Florida north and west to beyond the limits of our territory. Small's Manual gives this as C. repanda (Pers.) Small.

#### 4. Cicuta L.

- 1. Fruit grooved at the junction of the carpels \_\_\_\_\_ 1. C. curtissii.
- 1. Fruit not grooved at the junction of the carpels\_\_\_\_\_ 2. C. maculata.
- 1. C. curtissii Coult. & Rose—Swamps in the Coastal Plain, Florida north and west to beyond the limits of our territory.
- 2. C. maculata L.—Swamps, mostly in the western part of our territory.

#### 5. Sium [Tourn.] L.

S. suave Walt.—Uncommon in ponds, marshes, and swamps over most of our area. Small lists this as S. cicutaefolium Schrank.

#### 6. Ptilimnium Raf.

- 1. Leaves compound, with narrowly linear segments. \_\_\_\_ 2.
  - Fruit 2 mm. long or more; if only 2 mm. long 2. sepals deltoid.
  - Fruit 1.5 mm. long or less; sepals lanceolate to 2. P. nuttallii. subulate.
- 3. Sepals deltoid; fruit about 2 mm. long\_\_\_\_\_\_ 3. P. capillaceum.
- 3. Sepals lanceolate to subulate; fruit 3-4 mm. long\_\_\_\_ 4. P. costatum.
- 1. P. nodosum (Rose) Mathias—Known only from ponds on the Coastal Plain, Southwest Georgia.
- 2. P. nuttallii (DC.) Britton—Swamps in our region from Alabama westward.
- 3. P. capillaceum (Michx.) Raf.—Published range includes all of our area, but probably most common in wet areas along the coast.
- 4. P. costatum (Ell.) Coult. & Rose—Coastal Plain swamps, Georgia to North Carolina.

### 7. Oxypolis Raf.

O. filiformis (Walt.) Britton—Acid low pinelands and shallow ponds and swamps, Coastal Plain, Florida to South Carolina and westward to beyond the limits of our range.

# CLETHRACEAE White alder family

#### 1. Clethra [Gronov.] L.

- 1. Leaf-blades glabrous beneath or nearly so\_\_\_\_\_\_ 1. C. alnifolia.
- 1. Leaf-blades densely hairy or wooly beneath\_\_\_\_\_ 2. C. tomentosa.
- 1. C. alnifolia L. Sweet Pepperbush—Swamps, mostly acid, Florida north and west to beyond the confines of our area.
- 2. C. tomentosa Lam.—Similar situations to the preceding, but distribution more restricted. Found from North Florida to North Carolina and Alabama in the Coastal Plain.

# ERICACEAE Heath family

#### 1. Leucothoë D. Don

- 1. Flower clusters axillary 1. L. acuminata.
- 1. Flower clusters terminal\_\_\_\_\_\_ 2. L. racemosa.
- 1. L. acuminata (Ait.) D. Don. Fetter-bush—Acid swamps and ponds, Coastal Plain, Florida to South Carolina. The related L. axillaris (Lam.) D. Don may perhaps occasionally be found in aquatic situations.
- 2. L. racemosa (L.) A. Gray--Found in two varieties in acid swamps and ponds, Coastal Plain, Florida north and west to beyond the boundaries of our territory. The treatment here includes *Eubotrys racemosa* (L.) Nutt. and *E. elongata* Small of Small's Manual of the Southeastern Flora.

# 2. Ampelothamnus Small

A. phyllyreifolius (Hook.) Small—Found usually climbing on cypress in acid ponds and swamps, Coastal Plain, North Florida to Alabama and Georgia in the Coastal Plain.

#### 3. Desmothamnus Small

D. lucidus (Lam.) Small—Common shrub of acid swamps, ponds, and bays; Coastal Plain, Florida north and west to beyond the limits of our territory.

# PRIMULACEAE Primrose family

#### 1. Hottonia L.

H. inflata Ell. Featherfoil—Published range includes all of our Coastal Plain, but rare. Seems to be most common in the neutral waters of aquatic areas in the Mississippi Valley.

#### 2. Samolus [Tourn.] L.

S. pauciflorus Raf. Water Pimpernel—Wet places, usually not acid, over all of our territory.

# **OLEACEAE** Olive family

### 1. Fraxinus [Tourn.] L.

- 1. Twigs pubescent; fruit not as below...... 1. F. profunda.
- Twigs glabrous or, if pubescent, the body of the fruit 2. broadly winged to base.
  - 2. Leaflets usually 5, thick and leathery \_\_\_\_ 2. F. pauciflora.
  - 2. Leaflets usually 7, not so thick nor leathery \_\_\_\_ 3. F. caroliniana.
- 1. F. profunda Bush—Swamps, Georgia to Alabama and northward.
- 2. F. pauciflora Nutt. Water Ash—Swamps in the lower Coastal Plain, Florida to Georgia and west to the limit of our territory.
- 3. F. caroliniana Mill. Water Ash—Swamps, over all of our Coastal Plain.

#### 2. Forestiera Poir.

F. acuminata (Michx.) Poir. Swamp Privet—Most frequently in river swamps, over all but the northeastern portion of our territory.

# LOGANIACEAE Logania family

#### 1. Cynoctonum J. F. Gmel.

C. mitreola (L.) Britton—Occasionally aquatic, found mostly in the Coastal Plain, Florida north and west to beyond the limits of our range.

# GENTIANACEAE Gentian family

#### 1. Sabatia Adans.

- - 2. Sepals foliaceous, broadened near end\_\_\_\_\_ 1. S. calycina.
  - 2. Sepals not foliaceous, elliptic\_\_\_\_\_ 2. S. campanulata.
- 3. Petals less than 2.5 cm. long, usually acutish at tip\_\_\_\_ 4.
- 3. Petals more than 2.5 cm. long, usually rounded at tip.\_ 3. S. decandra.
  - 4. Sepals much shorter than corolla 4. S. harperi.
  - 4. Sepals as long as corolla or nearly so\_\_\_\_\_ 5. S. foliosa.
- 1. S. calycina (Lam.) Heller—Alluvial situations over all of our Coastal Plain.
- 2. S. campanulata (L.) Torr.—Range includes all of our territory. Most common in acid moist places in the Coastal Plain, sometimes in ponds.
- 3. S. decandra (Walt.) Harper—Cypress and perhaps other ponds, Coastal Plain, Florida to Alabama and South Carolina.
- 4. S. harperi Small—Acid swamps and along pond-margins, Coastal Plain, Florida to Alabama and South Carolina.
  - 5. S. foliosa Fernald—Coastal Plain in Florida and Alabama.

# MENYANTHACEAE Bogbean family

#### 1. Nymphoides [Tourn.] Hill

- 1. Leaf-blades thick, pitted beneath; petiole purple-gland-  $\,$  1.  $\,$  N.  $\,$   $\,$   $\,$   $\,$   $\,$   $\,$  ular.
- Leaf-blades thin, not pitted beneath; petiole slender 2. N. cordatum, and smooth.
- 1. N. aquaticum (Walt.) Kuntze. Floating-heart—Range includes all of our Coastal Plain. Most often seen in rather acid and often open ponds.
- 2. N. cordatum (Ell.) Fernald—Less common than the preceding in most of our territory, but found in similar situations and with roughly the same range. N. lacunosum (Vent.) Kuntze is the name given this species in Small's Manual.

# CONVOLVULACEAE Morning glory family

#### 1. Breweria R. Brown

B. aquatica (Walt.) A. Gray—Found infrequently around shallow ponds. Range includes all of our Coastal Plain.

# HYDROPHYLLACEAE Waterleaf family

### 1. Hydrolea L.

- Flowers in terminal clusters; styles several times as 2. long as ovary, pubescent at base; filaments as long or nearly as long as corolla.
- Flowers in axillary clusters; styles slightly longer than 3. ovary, glabrous; filaments much shorter than corolla.
  - 2. Leaf-blades ovate to elliptic; calyx lobes less 1. H. ovata. than 7 mm. long; flowers paniculate.
  - 2. Leaf-blades elliptic to elliptic-lanceolate; calyx 2. H. corymbosa. lobes over 7 mm. long; flowers corymbose.
- 3. Sepals linear or linear-lanceolate; stem villous above\_\_\_\_ 3. H. quadrivalvis.
- 3. Sepals ovate-lanceolate; stem nearly glabrous above \_\_\_\_ 4. H. affinis.
- 1. H. ovata Nutt.—Ponds and swamps, Coastal Plain, Georgia north and west to beyond the limits of our territory.
- 2. H. corymbosa Macbride—Limited in distribution, Coastal Plain, Florida to South Carolina, mostly in calcareous swamps.
- 3. H. quadrivalvis Walt.—Probably the most frequent species of the genus in our territory. Range includes all of our Coastal Plain, often in acid places.
- 4. H. affinis A. Gray—Swampy places, but in our territory only in its western part in Mississippi.

# VERBENACEAE Verbena family

### 1. Lippia [Houston] L.

L. lanceolata Michx. Frog-fruit—Found mostly in alluvial situations, over most of our area. L. nodiflora (L.) Michx., a creeping

species, is found in moist places in various parts of our territory, but is not truly aquatic. Small lists these species under the genus *Phyla*.

# LABIATAE Mint family

#### 1. Scutellaria L.

S. laterifolia L. Skullcap—Found over all of our area, apparently most common in alluvial situations.

#### 2. Lycopus [Tourn.] L.

- 1. Blades of the lower leaves divided or deeply lobed\_\_\_\_ 1. L. americanus.
- 1. Blades of the lower leaves merely toothed\_\_\_\_\_2.
  - 2. Leaf-blades petioled \_\_\_\_\_ 2. L. rubellus.
  - 2. Leaf-blades sessile and sometimes clasping. \_ \_ 3.
- 3. Stems glabrous at least on the lower part; bracts sub- 3. L. sessilifolius. tending flower clusters narrowed to base.
- Stems densely puberulent or finely pubescent; bracts 4. L. pubens. truncate at base.
  - 1. L. americanus Muhl.—Wet places over all of our territory.
- 2. L. rubellus Moench—Coastal Plain in various situations including river swamps, Florida north and west to beyond the confines of our area.
- 3. L. sessilifolius A. Gray-Distribution almost the same as that of the preceding.
- 4. L. pubens Britton—Coastal Plain in acid pineland ponds, Florida to Mississippi and South Carolina.

# SCROPHULARIACEAE Figwort family

# 1. Herpestris Gaertn. f.

H. rotundifolia Gaertn. f.—Ponds near the coast, Florida to beyond our limit in the north. Not restricted to tidal habitats as has been supposed.

#### 2. Hydrotrida Small

H. caroliniana (Walt.) Small—Range includes all of our Coastal Plain. Not frequently recorded from some areas, but in Georgia it is common in limesink ponds in the Southern part of the State and has been noted a few times along the coast.

#### 3. Gratiola L.

- Leaves elliptic-lanceolate to ovate; capsule equalling 1. G. virginiana.
   or exceeding sepals.
- 1. Leaves linear-lanceolate; capsule exceeded by sepals\_\_\_ ?. G. ramosa.
- 1. G. virginiana L. Hedge Hyssop—Range includes all of our territory, and is occasionally found in truly aquatic areas especially in alluvial situations.

2. G. ramosa Walt.—Coastal Plain, Florida north and west to beyond the limits of our territory. Found in aquatic situations mostly in acid pineland swamps or pools.

#### 4. Micranthemum Michx.

M. umbrosum (Walt.) Blake—Shallow ponds, often acid, Florida to North Carolina and west to beyond our limits in the Coastal Plain.

#### 5. Mimulus L.

- 1. Leaves not petioled; stem not winged...................... 1. M. ringens.
- 1. Leaves petioled; stem 4-winged\_\_\_\_\_\_ 2. M. alatus.
- 1. M. ringens L. Monkey-flower—Range includes all of our states, occurring mostly along streams. Rare in the Coastal Plain.
- 2. M. alatus Ait.—The remarks concerning the preceding can also be applied to this.

### ACANTHACEAE Acanthus family

#### 1. Hygrophila R. Brown

H. lacustris (Schlecht.) Nees—Lower Coastal Plain, Florida westward but has its best development in the lower Mississippi delta marshes.

#### 2. Justicia L.

- 1. Corolla 2-2.5 cm. long
   1. J. crassifolia.

   1. Corolla about 1 cm. long
   2.

   2. Flowers in head-like spikes
   3.
  - Flowers scattered along one side of the upper 4.
    part of stalk.
- 3. Leaves linear, mostly shorter than peduncle\_\_\_\_ 2. J. americana.
- - 4. Leaves not remote or reflexed; corolla-tube 8-10 5. J. lanceolata. mm. long.
- 1. J. crassifolia Chapm.—Known only from swamps on the Coastal Plain in Florida.
- 2. J. americana (L.) Vahl—Georgia north and west to beyond the limits of our territory. Most common along rivers, and in the Tennessee Valley is often found in association with the production of Anopheles quadrimaculatus. This species is listed by Small under the genus Dianthera.
- 3. J. humilis Michx.—Swamps, Coastal Plain, Florida north and west to beyond the limits of our territory, often in alluvial situations. This species is called J. ovata Walt. by Small.\*
- 4. J. angusta (Chapm.) Small—Known only from pineland ponds in Florida.
- 5. J. lanceolata (Chapm.) Small—Swamps on the Coastal Plain, Florida north and west to beyond the boundaries of our area.

# LENTIBULARIACEAE Bladderwort family

#### 1. Utricularia L.

1. Stems erect from base, definitely anchored in substra- 2.	
tum; leaves and bladders rarely seen.	
1. Stems mostly drifting free in water; leaves dissected 3.	
and bladder bearing.	
2. Flowers yellow 1. U. cornuta	
2. Flowers purple 2. U. resupin	ata
3. Flowers purple 3. U. purpur	
3. Flowers yellow 4.	
4. Scape with a conspicuous whorl of inflated 4. U. inflata.	
floats at base.	
4. Scape without a whorl of floats 5.	
5. Scape usually with 5-25 flowers, stout, over 10 cm. high. 6.	
5. Scape usually with 1-2 flowers, slender, less than 10 cm. 8.	
high.	
6. Leaves forked and each fork 2-3 times divided; 7.	
flowers 12-15 mm. broad.	
6. Leaves forked and each fork 4-5 times dissected; 5. U. foliosa.	
flowers 15-20 mm. broad.	
7. Pedicels recurved at maturity; scapes erect 6. U. vulgaris	· ·
7. Pedicels straight at maturity; scapes flexuous 7. U. floridan	
8. Spur equalling or longer than lower lip of corolla_ 9.	
8. Spur shorter than lower lip of corolla 8. U. gibba.	
9. Spur tapering from base to apex; all leaves bladder- 9. U. biflora.	
bearing.	
9. Spur conic below and linear near tip; some leaves with- 10. U. fibrosa	

1. U. cornuta Michx.—As considered here this species includes Stomoisia cornuta (Michx.) Raf. and S. juncea (Vahl.) Barnh. as cited by Small. The species is primarily of Coastal Plain distribution, although it is known from other provinces, and its range includes all of our territory. It is ordinarily found in acid places. A local species, U. virgatula Barnh., occurs also in our territory. It may be distin-

out bladders.

2. U. resupinata B. D. Greene—Shallow water, Florida north to beyond the limits of our territory. Small gives this species as Lecticula resupinata (B. D. Greene) Barnh.

guished by its very short corolla which is scarcely longer than the calyx.

- 3. U. purpurea Walt.—Ponds and lakes of varying acidity, its range covering all of our territory. It is listed by Small as Vesiculina purpurea (Walt.) Raf. Anopheles quadrimaculatus breeding has been found associated with this and other plants of this genus.
- 4. *U. inflata* Walt.—Coastal Plain over all of our territory, in ponds with wide range of acidity. There is a smaller variety distinguished by Small as *U. radiata* Small.
- 5. U. foliosa L.—Large flowered species, lower Coastal Plain, Florida westward along the Gulf of Mexico to beyond the limits of our territory.

- 6. U. vulgaris L.—This species is cited by Small as U. macrorhiza LeConte. Present in our territory only in the northern part. Probably occurs in North Carolina and has been collected in Northwest Tennessee.
- 7. U. floridana Nash—Ponds on the Coastal Plain in Florida and Georgia.
- 8. U. gibba L.—Ranges over all of our area, but probably most common in shallow water of the Coastal Plain.
- 9. U. biflora Lam.—This species is given as U. pumila Walt. by Small. Coastal Plain, Florida north and west to beyond the limits of our territory.
- 10. U. fibrosa Walt.—Pineland ponds, Coastal Plain, Florida to Mississippi and north to beyond the limits of our territory.

# RUBIACEAE Madder family

### 1. Pinckneya Michx.

P. pubens Michx. Georgia Feverbark—Sandy, acid swamps, Middle Florida to the extreme southern part of South Carolina in the Coastal Plain.

### 2. Cephalanthus L.

C. occidentalis L. Buttonbush—Commonest aquatic shrub and is very often found in ponds supporting the breeding of Anopheles quadrimaculatus. Shows the widest degree of acidity tolerance, being found in the extremely acid Okefinokee Swamp and neutral or even alkaline limesinks and alluvial swamps. Range covers all of our territory.

# CAPRIFOLIACEAE Honeysuckle family

### 1. Sambucus [Tourn.] L.

- 1. Lateral leaflets 2–3 times divided, especially the lower  $\,$  2.  $S. \,$  simpsonii. pair.
- 1. S. canadensis L. Elder—Moist places over all our range except possibly in Florida.
- 2. S. simpsonii Rehder. Gulf Elder—Lower Coastal Plain, Florida to Louisiana, in marshes and hammocks.

# CAMPANULACEAE Bell-flower family

### 1. Campanula [Tourn.] L.

C. floridana S. Wats.—Grassy swamps and marshes, East Florida and the peninsula.

# COMPOSITAE Composite family

### 1. Sclerolepis Cass.

S. uniflora (Walt.) B. S. P.—Pineland and cypress ponds, Coastal Plain, Florida to Alabama and north to beyond the limits of our territory.

#### 2. Eupatorium L.

- 1. Flowers purple
   1. E. coelestinum.

   1. Flowers white
   2.

   2. Leaf-blades narrowed at the base
   3.

   2. Leaf-blades broadened at the base
   2. E. rotundifolium.
- 3. Bracts of the involucre acute or acuminate; leaves remotely toothed or nearly entire.

  3. E. leucolepis.
- 3. Bracts of the involucre obtusish; leaves sharply toothed. 4. E. semiserratum.
- 1. E. coelestinum L. Mist-flower—Includes all of our area. Marshes and along pond margins often in alluvial situations.
- 2. E. roundifolium L.—The range of this species in all of its varieties covers all of our area, but it is commonest on the Coastal Plain. It is often non-aquatic but is occasionally found in swamps. As used here E. roundifolium includes also E. verbenaefolium, E. pubescens, and E. scabridum of Small's Manual
- 3. E. leucelepis (DC.) T. & G.—Ranges over all of our Coastal Plain in acid ponds or bogs.
- 4. E. semiserratum DC.—Swamps and ponds in the Coastal Plain, Florida north and west to beyond the limits of our territory.

#### 3. Mikania Willd.

M. scandens (L.) Willd. Hemp-weed—Swamps, mostly alluvial, over all of our territory.

#### 4. Pluchea Cass.

- 1. Plants perennial 2.
  1. Plants annual 3.
  - Outer bracts of involucre acuminate: 1. P. foetida.
     Outer bracts of involucre obtuse or merely acute. 2. P. imbricata.
- 3. Leaves not decurrent on stem making it winged\_\_\_\_\_ 3. P. petiolata.
- 3. Leaves decurrent on stem making it winged \_\_\_\_\_ 4. P. quitoc.
- 1. P. foetida (L.) DC.—Ponds, mostly in the Coastal Plain, Florida north and west to beyond the limits of our territory.
- 2. P. imbricata (Kearney) Nash—Swamps and ponds, Coastal Plain, Florida to South Carolina.
- 3. P. petiolata Cass.—Most often found in alluvial situations, its range covering all of our territory.
- 4. P. quitoc DC.—Naturalized species, known in this country from marshy places in West Florida.

#### 5. Coreopsis L.

C. nudata Nutt.—Pink-flowered species found in acid ponds and wet pinelands, lower Coastal Plain, Georgia and Florida.

#### 6. Bidens L.

- 1. Flowers inconspicuous (ray-flowers wanting) 2.

  1. Flowers conspicuous, yellow 3.

  2. Achene long-awned, awns barbed downward 1. B. frondosa.

  2. Achene short-awned, awns barbed upward 2. B. discoidea.

  3. Leaf-blades simple 4.

  3. Leaf-blades compound 6.

  4. Achene straight, flat, not strongly keeled, and without pale corky margins; rays 1.5-3 cm. long.

  4. Achene curved, strongly keeled, and with pale 4. B. cernua.
- corky margins; rays not over 1.7 cm.

  5. Achene 6-8 mm. long, ciliate\_\_\_\_\_\_ 5. B. coronata.
- 5. Achene 2-4 mm. long, not ciliate\_\_\_\_\_ 6. B. mitis.
- 1. B. frondosa L.—Damp soil, often as a weed, over most of our area.
- 2. B. discoidea (T. & G.) Britton—Georgia westward and northward to beyond the limits of our area, in swamps and around pond margins.
- 3. B. laevis (L.) B. S. P.—Range similar to the preceding, but more common in the Coastal Plain. Found in swamps and low woods.
- 4. B. cernua L.—Found mostly north of our territory, but recorded from wet places in North Carolina, Georgia, and Tennessee.
- 5. B. coronata (L.) Britton—Swamps, ranging over all of our territory.
- 6. B. mitis (Michx.) Sherff—Coastal Plain, Florida west to Mississippi and north to beyond the limits of our territory.

#### PRINCIPAL WORKS CONSULTED IN COMPILATION OF GUIDE

BRITTON, N. L. and Addison Brown.

1913. AN ILLUSTRATED FLORA OF THE NORTHERN UNITED STATES, CANADA AND THE BRITISH POSSESSIONS. ed. 2. Scribner.

COKER, W. C. and H. R. TOTTEN.

1937. TREES OF THE SOUTHFASTERN STATES. University of North Carolina Press, Chapel Hill.

FASSETT, N. C.

1940. A MANUAL OF AQUATIC PLANTS. McGraw-Hill, New York.

HITCHCOCK, A. S.

1935. MANUAL OF THE GRASSES OF THE UNITED STATES. U. S. Department of Agriculture, Miscellaneous Publication No. 200.

ROBINSON, B. L. and M. L. FERNALD, ed.

1908. Ghay's NEW MANUAL OF BOTANY. 7th Edition, American Book Company, New York.

SARGENT, C. S.

1922. MANUAL OF THE TREES OF NORTH AMERICA. ed. 2. Houghton Mifflin, New York.

SMALL, J. K.

1933. MANUAL OF THE SOUTHEASTERN FLORA. Science Press, Lancaster, Pa.

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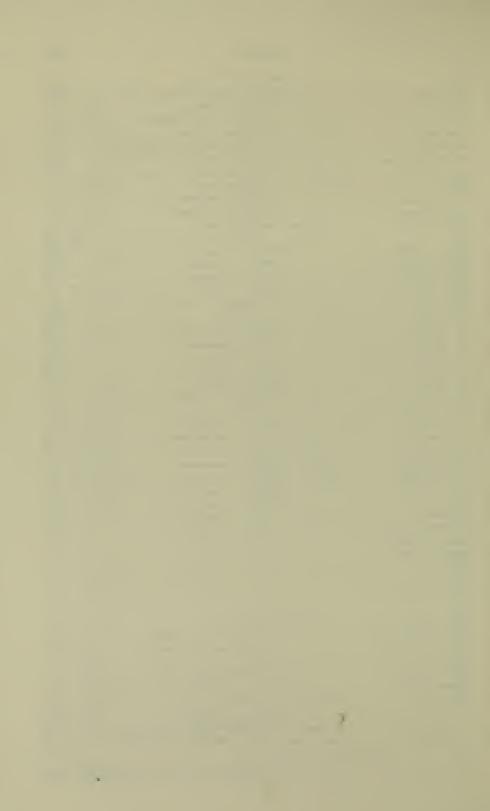
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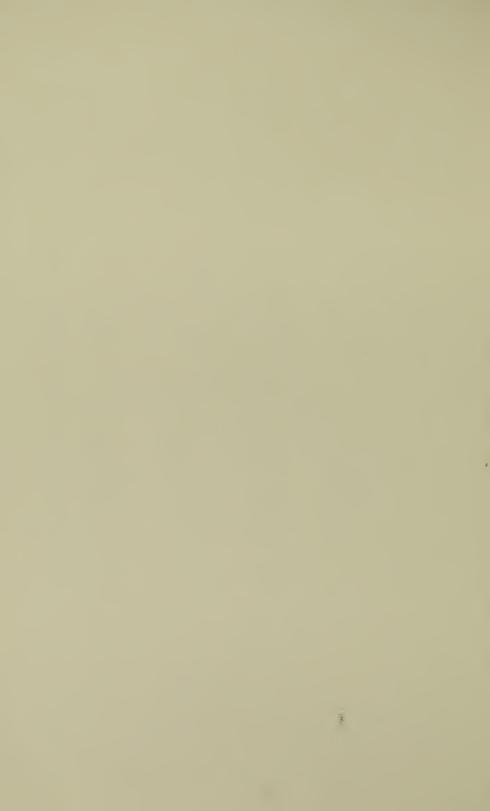
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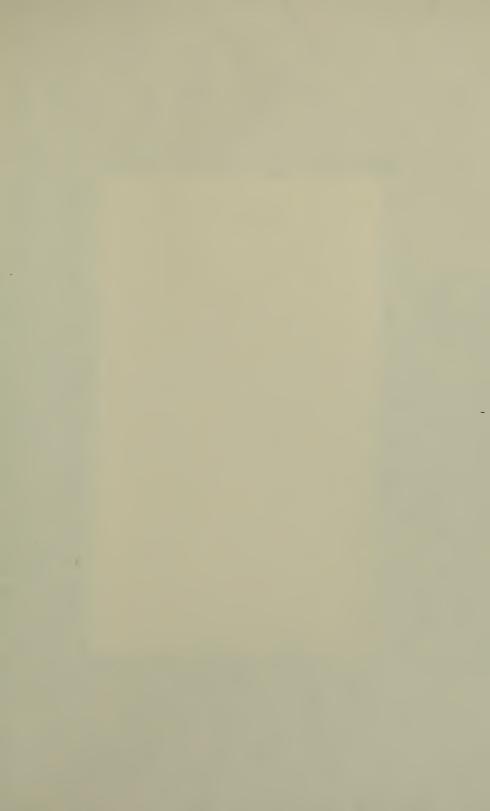
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